VERITAS NetBackup 4.0V ServerFree Agent

System Administrator’s Guide

Solaris

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VERITAS

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About This Guide

This guide explains how to install, configure, and use VERITAS NetBackup 4.0V ServerFree Agent.

Audience

This guide is intended for the NetBackup system administrator and assumes a thorough working knowledge of both UNIX and NetBackup administration.

Organization

- Chapter 1, “Introduction,” is an overview of the product’s capabilities, with background information on frozen images and offhost backup.
- Chapter 2, “Hardware Configuration,” provides assistance in setting up the hardware.
- Chapter 3, “Installation,” explains how to install and de-install NetBackup ServerFree Agent.
- Chapter 4, “NetBackup Configuration,” explains how to configure frozen images and offhost backup.
- Chapter 5, “Using NetBackup,” briefly explains how to back up and restore files.
- Chapter 6, “Troubleshooting,” helps in resolving problems that may occur when using NetBackup ServerFree Agent.
- Appendix A, “Solaris snapctl Driver,” provides information about the `snapctl` driver.

Related Manuals

- *NetBackup 4.0V ServerFree Agent Release Notes*

  Describes supported platforms and provides operating notes not found in the manuals or in the online help.

- *NetBackup 4.0V ServerFree Agent User's Guide - UNIX*

  Explains how to perform user-directed backups, restores, and archives on a UNIX NetBackup client.

- *NetBackup for Oracle ServerFree Agent System Administrator's Guide - Solaris*

  Explains how to install, configure, and use NetBackup for Oracle ServerFree Agent to back up and restore Oracle databases that are on a UNIX NetBackup client.

  For this NetBackup Oracle product, you may also need the following manuals from Oracle Corporation:

  Oracle Enterprise Manager Administrator's Guide

  Oracle8i Backup and Recovery Guide

  Oracle8i Recovery Manager User's Guide and Reference

- *NetBackup DataCenter System Administrator's Guide - UNIX*

  Explains how to configure and manage NetBackup on a UNIX platform.

- *NetBackup DataCenter Installation Guide - UNIX*

  Explains how to install NetBackup DataCenter for UNIX.

- *NetBackup DataCenter Media Manager System Administrator's Guide - UNIX*

  Explains how to configure and manage the storage devices and media that UNIX NetBackup servers use for backups.

- *NetBackup Media Manager Device Configuration Guide*

  Provides information about configuring storage devices on UNIX systems.

- *NetBackup Troubleshooting Guide - UNIX*

  Provides troubleshooting information for NetBackup 3.4 DataCenter. For help in troubleshooting NetBackup 4.0V ServerFree Agent, refer to Chapter 6, "Troubleshooting," in the manual you are now reading.

Conventions

The following explains typographical and other conventions used in this guide.

Type Style

Table 1. Typographic Conventions

Typeface	Usage
`Bold fixed width`	Input. For example, type **`cd`** to change directories.
`Fixed width`	Paths, commands, filenames, or output. For example: The default installation directory is `/opt/VRTSxx`.
Italics	Book titles, new terms, or used for emphasis. For example: *Do not* ignore cautions.
Sans serif (italics)	Placeholder text or variables. For example: Replace *filename* with the name of your file.
Sans serif (no italics)	Graphical user interface (GUI) objects, such as fields, menu choices, etc. For example: Enter your password in the Password field.

Notes and Cautions

Note This is a Note and is used to call attention to information that makes it easier to use the product or helps you to avoid problems.

Caution This is a Caution and is used to warn you about situations that can cause data loss.

Key Combinations

Some keyboard command sequences use two or more keys at the same time. For example, you may have to hold down the Ctrl key while you press another key. When this type of command is referenced, the keys are connected by plus signs. For example:

Press Ctrl+t

Command Usage

The following conventions are frequently used in the synopsis of command usage.

brackets [ ]

The enclosed command line component is optional.

Vertical bar or pipe (|)

Separates optional arguments from which the user can choose. For example, when a command has the following format:

`command` *arg1*|*arg2*

the user can use either the *arg1* or *arg2* variable.

Getting Help

For updated information about this product, including system requirements, supported platforms, supported peripherals, and a list of current patches available from Technical Support, visit our web site:

`http://www.veritas.com/`

VERITAS Customer Support can also be reached by email at:

`support@veritas.com`

Introduction 1

This chapter introduces NetBackup 4.0V ServerFree Agent and contains the following topics.

- Overview
- Terminology
- Features
- Requirements
- Restrictions
- Frozen Image Overview
- Offhost Backup Overview

Overview

NetBackup 4.0V ServerFree Agent provides data protection services for frozen image data, and supports offhost backup over Fibre Channel networks (in addition to conventional backups to locally attached devices).

Frozen Image Services

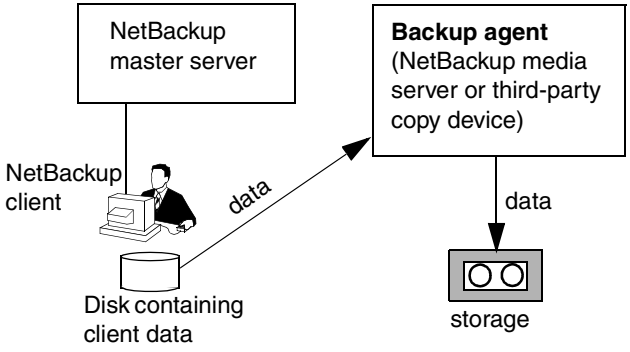
A frozen image is a stable disk copy of the client's data made prior to backup. Such a copy is important on file systems and active Oracle databases, where updates to files or tables can occur at any time. Making a stable, consistent copy (frozen image) is an important prerequisite to making a correct backup.

NetBackup ServerFree Agent supports several ways of creating a frozen image. Refer to "Frozen Image Overview" on page 10 for further description of frozen image technology.

Offhost Backups

The other major component of NetBackup 4.0V ServerFree Agent is support for offhost backup. Offhost backup shifts the burden of backup processing onto a separate backup agent (NetBackup media server or third-party copy device), greatly reducing the impact on the client's computing resources ordinarily caused by a local backup. A backup agent executing on another host reads the data from the client disk and writes it to storage.

Figure 1. Separate backup agent for offhost backup



The backup agent can be either a NetBackup media server or a third-party copy device that implements the SCSI Extended Copy command.

Terminology

This section introduces terms used with NetBackup 4.0V ServerFree Agent.

Backup agent (also see Third-Party Copy Device)

A general term for the host that manages the backup on behalf of the NetBackup client. In NetBackup 4.0V, this is either the NetBackup media server or a third-party copy device.

Bridge

In a SAN network, a *bridge* connects SCSI devices to Fibre Channel. A *third-party copy device* can be implemented as part of a bridge or as part of other devices. Note that not all bridges function as third-party copy devices.

Copy manager (see Third-Party Copy Device)

Data movement

A copy operation as performed by a third-party copy device or NetBackup media server.

Extent

A contiguous set of disk blocks allocated for a file and represented by two values: starting block address (offset in the device) and length (number of contiguous blocks). The *mapping methods* in ServerFree Agent determine the list of extents and send the list to the backup agent.

Fibre channel

A type of high-speed network composed of either optical or copper cable and employing the Fibre Channel protocol. NetBackup 4.0V ServerFree Agent supports both arbitrated loop and switched fabric (switched fibre channel) environments.

File list

The list of files to be backed up for a NetBackup class. For ServerFree Agent, the files in a file list must be part of a file system that was designated as a frozen image source.

File system

Has two different meanings.

- When referring to a product, such as the ufs (Sun Solaris) or VxFS (VERITAS) *file system*, it refers to the management and allocation schemes on which the entire file tree is structured.
- When referring to a particular component in a file tree, *file system* means a directory (with any subdirectories and files) that is attached to the UNIX file tree by means of the `mount` command. When a file system is selected as either a frozen image source or as an entry in the NetBackup file list, this definition applies.

Frozen image

A stable disk copy of the data prior to backup. A *frozen image* is created very rapidly, causing minimal impact on other applications. There are two basic types: *copy-on-write snapshot* and *mirror*.

Frozen image method

A set of routines for creating a frozen image.

Frozen image source

This designates the entity (file system, raw partition, or logical volume) to which a frozen image method is applied. Note that the frozen image source does not identify the files to be backed up (see *file list*).

Mapping

The process of converting a file (in the file system or Volume Manager) to absolute physical addresses for use by backup agents on the network. NetBackup ServerFree Agent uses the *VfMS* library to perform file mapping.

Mapping methods

A set of routines for converting logical addresses to absolute physical addresses. NetBackup ServerFree Agent includes support for file-mapping and volume-mapping methods.

Mirror

A type of frozen image (see also *snapshot*). All writes to the disk or volume (primary data) are also made to a physically separate disk or volume called a *mirror*. The mirror maintains a complete duplicate of the primary disk or volume. At an appropriate moment, all further writes to the primary disk or volume are held back from the mirror, the mirror thus becoming a stable or frozen image of the primary. The frozen image can then be backed up.

NetBackup Media Server (offhost backup method)

One of two offhost backup methods provided by NetBackup ServerFree Agent, in which data movement is performed by a NetBackup media server.

Offhost backup

The off-loading of backup processing to a separate backup agent executing on another host. NetBackup ServerFree Agent contains two offhost backup options: NetBackup Media Server and Third-Party Copy Device.

Raw partition

A single section of a physical disk device occupying a range of disk sectors, without a file system or other hierarchical organization scheme (thus, a “raw” stream of disk sectors).

SAN (Storage Area Network)

A Fibre Channel-based network connecting servers and storage devices. The storage devices are not attached to servers but to the network itself, and are visible to all servers on the network.

Snapshot (copy-on-write)

In NetBackup ServerFree Agent, one of two types of supported frozen images (see also *mirror*). Unlike a mirror, a copy-on-write snapshot does not create a separate copy of the primary data (frozen image source). It creates a block-by-block "account" that describes which blocks in the frozen image source have changed and which have not, from the instant the snapshot was activated. This account is used by the backup application to create the backup copy.

Snapshot mirror

An exact copy of a primary volume at a particular moment, reproduced on a physically separate device. Snapshot mirrors are created by the VERITAS Volume Manager (VxVM).

Third-Party Copy Device (SAN network device and offhost backup method)

This term has two meanings:

- A backup processor on the SAN that operates on behalf of backup applications. The *third-party copy device* receives backup data from a disk attached to Fibre Channel and sends it to a storage device, using the SCSI Extended Copy command. The third-party copy device is sometimes called a copy manager, third-party copy engine, or data mover. In SAN hardware configurations, a third-party copy device can be implemented as part of a bridge, router, or other device.
- An offhost backup method in NetBackup ServerFree Agent that allows backups to be made by means of a backup processor on the SAN.

ufs file system

This is the UNIX File System (ufs), which is the default file system type on Sun Solaris. The ufs file system was formerly the Berkeley Fast File System.

VfMS (VERITAS Federated Mapping Services)

A library of routines (methods) used by NetBackup ServerFree Agent to obtain the physical addresses of logical disk objects such as file and volume names.

VxFS

This is the VERITAS extent-based File System (VxFS), designed for high performance and large volumes of data.

VxVM

This is the VERITAS Volume Manager (VxVM), which provides logical volume management that can be used in SAN environments.

Volume

A virtual device configured over physical disk devices (not to be confused with a NetBackup *Media Manager* volume). If a frozen image source exists over a volume, NetBackup 4.0V automatically uses a volume mapping method to map the volume to physical device addresses.

For NetBackup 4.0V, volumes must be created by means of the VERITAS Volume Manager (VxVM).

Features

NetBackup 4.0V ServerFree Agent provides the following services and features.

General capabilities

- Backs up a variety of file systems.
- Supports NetBackup Standard, FlashBackup, and Oracle class types.
- Supports multiple data streams, except when using third-party copy device.

Frozen Image Services

NetBackup ServerFree Agent supports the following frozen image methods:

- **nbu_snap**, for copy-on-write snapshot frozen images.
- **fsclone**, for copy-on-write snapshot frozen images using VERITAS File System 3.4 clones. VERITAS File System 3.4 is included in the Database Edition for Oracle 2.2.
- **vxvm**, for frozen images using VERITAS Volume Manager 3.1 snapshot mirrors.

Offhost Backup

NetBackup ServerFree Agent provides two offhost backup services: *NetBackup Media Server* and *Third-Party Copy Device*. Both of these services eliminate backup overhead on the application host (NetBackup client), by off-loading backup processing to a NetBackup media server or third-party copy device on the network.

- **NetBackup Media Server**: the backup is performed by a NetBackup media server.
- **Third-Party Copy Device**: the backup is performed by an independent backup agent that uses the Extended Copy command. For a list of supported third-party copy devices and other peripherals, refer to the *NetBackup 4.0V Release Notes*.

Requirements

NetBackup 4.0V ServerFree Agent requires the following components:

- A master server running Solaris 2.6, Solaris 7, or Solaris 8, with NetBackup ServerFree Agent server software installed.
- Clients running Solaris 2.6, Solaris 7, or Solaris 8, with NetBackup ServerFree Agent client software installed.

Note Certain Solaris patches (for both servers and clients) may be required; for the latest information, please refer to the *NetBackup 4.0V Release Notes*, in the chapter titled "Operational Notes," in the subsection "NetBackup-Java Interfaces."

Please note the following additional requirements:

- To use the fsclone frozen image method, all clients must have the Database Edition for Oracle 2.2 or later installed with valid licenses, which includes support for VxFS 3.4.
- To use the vxvm frozen image method, all clients must have VxVM 3.1 or later.
- To use the frozen image and offhost backup features of NetBackup ServerFree Agent with a NetBackup Oracle class, UNIX clients must have Oracle8i installed.

Restrictions

For a complete list of supported peripherals, and for other operational notes, refer to the *NetBackup 4.0V Release Notes*. Please note the following restrictions:

- If you are using offhost backup (NetBackup Media Server or Third-Party Copy Device), the disk containing the client's data (the files to back up) must be either a SCSI or Fibre Channel device.
- If you are using offhost backup, the disk containing the client's data must be visible to both the NetBackup client and to the NetBackup media server. The disk can be connected to a SAN.
- To be used for offhost backup, the disk must be able to return its SCSI serial number in response to a serial-number inquiry (serialization).
- Multiple data streams and multiplexing are not supported for Third-Party Copy Device offhost backups.

Frozen Image Overview

Large active databases available around-the-clock are difficult to back up without incurring a penalty. Often, the penalty takes one of two forms:

- The entire database is taken offline to allow time for the data copy, resulting in suspension of service and inconvenience to users.
- The copy is made very quickly but produces an incomplete version of the data, some transactions having failed to complete.

The basic method of solving this problem is called a *frozen image*. This means "capturing" the data (such as a file system) at a particular instant, without causing significant downtime. The resulting capture or *image* can then be backed up without affecting the performance or availability of the application or database server. Without a complete, up-to-date image of the data, a correct backup cannot be obtained.

Figure 2. Creating a frozen image for backup

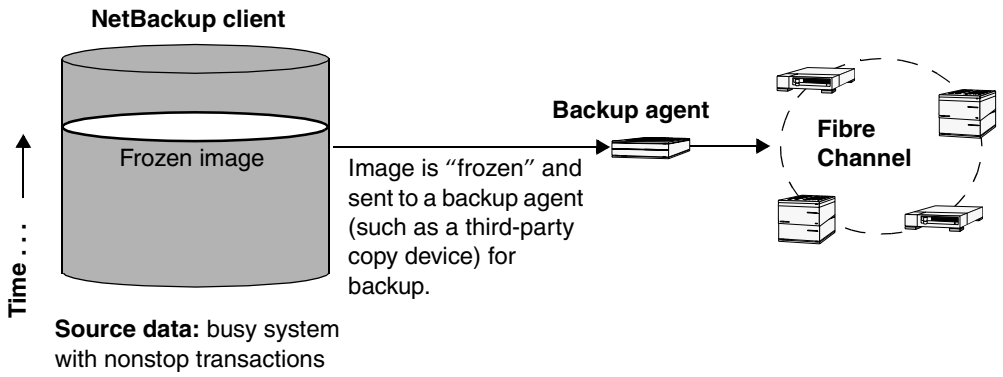

NetBackup client
Frozen image
Time . . .
Source data: busy system with nonstop transactions
Image is "frozen" and sent to a backup agent (such as a third-party copy device) for backup.
Backup agent
Fibre Channel

Figure 2 represents the creation of a frozen image; on a typical online system, several such images might be created within a 24-hour period.

When a backup is managed by a backup agent on a Fibre Channel network, the data to back up must be contained in a frozen image. This is because the backup agent on the network is unable to determine whether the data is currently being changed by another application. If the data is captured as a frozen image, NetBackup can correctly map the data to absolute physical addresses. Once the data is correctly mapped, it is ready to be backed up.

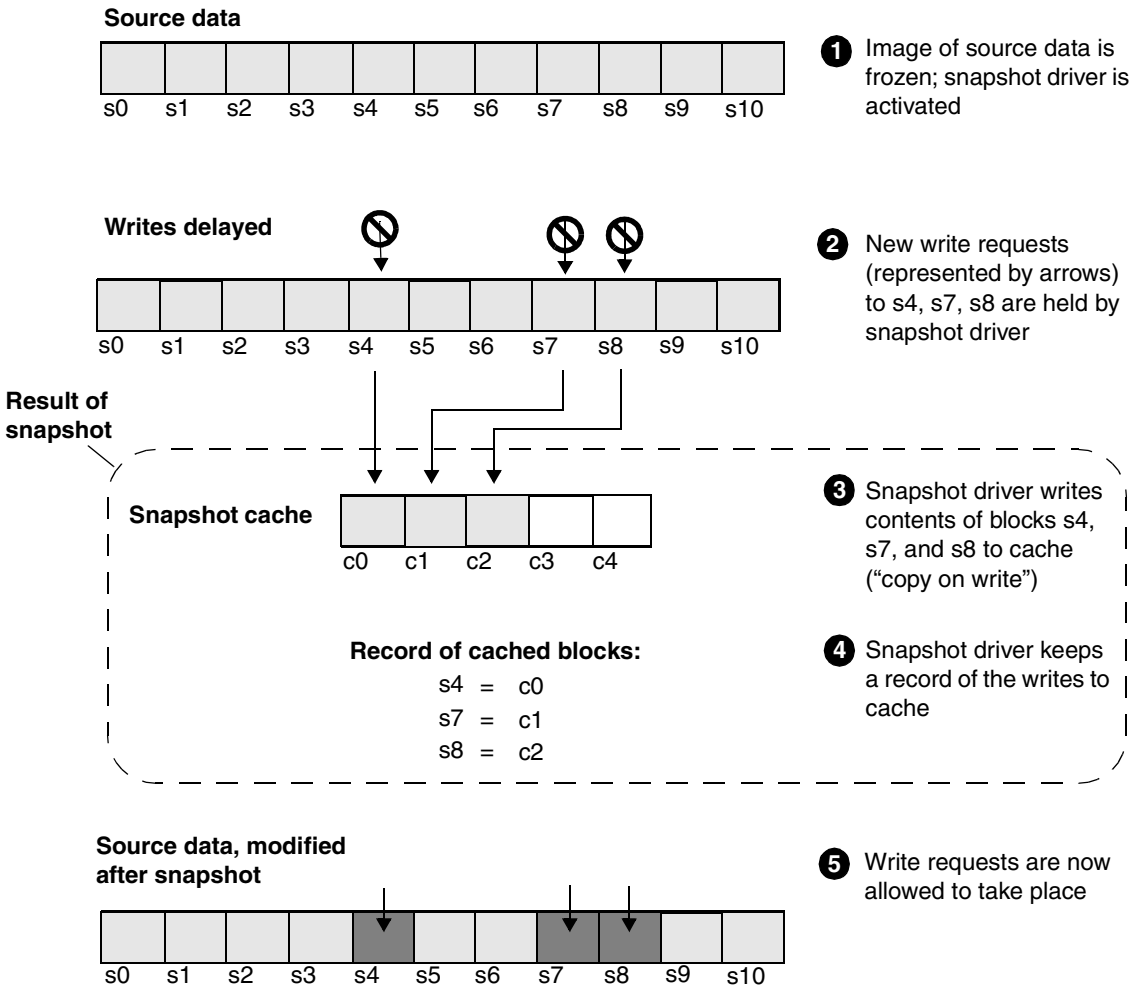
Two types of frozen image methods are available, both supported by NetBackup ServerFree Agent: *copy-on-write snapshots* and *mirrors*.

Copy-on-Write Snapshot

A copy-on-write snapshot is a detailed account of data as it existed at a certain moment. Unlike a mirror, explained in the next section, a copy-on-write snapshot is not really a *copy* of the data, but a particular "record" of it.

The copy-on-write snapshot process works as follows: when a frozen image is required, any unfinished transactions or changes to the source data are allowed to complete, but new changes are temporarily stalled. The source is momentarily idled (made quiescent), and a *snapshot driver* is activated. Once the snapshot driver is activated, new transactions or changes (writes) to the source data are allowed to take place. However, the snapshot driver briefly intercepts or holds the write requests. While holding those requests, it copies to cache any blocks that will be affected by those writes, and keeps a record of the cached blocks. In other words, it reads each source block that is about to change, copies the block's current data to cache, and records the location and identity of the cached blocks. Then the intercepted writes are allowed to take place in the source blocks. (See Figure 3.)

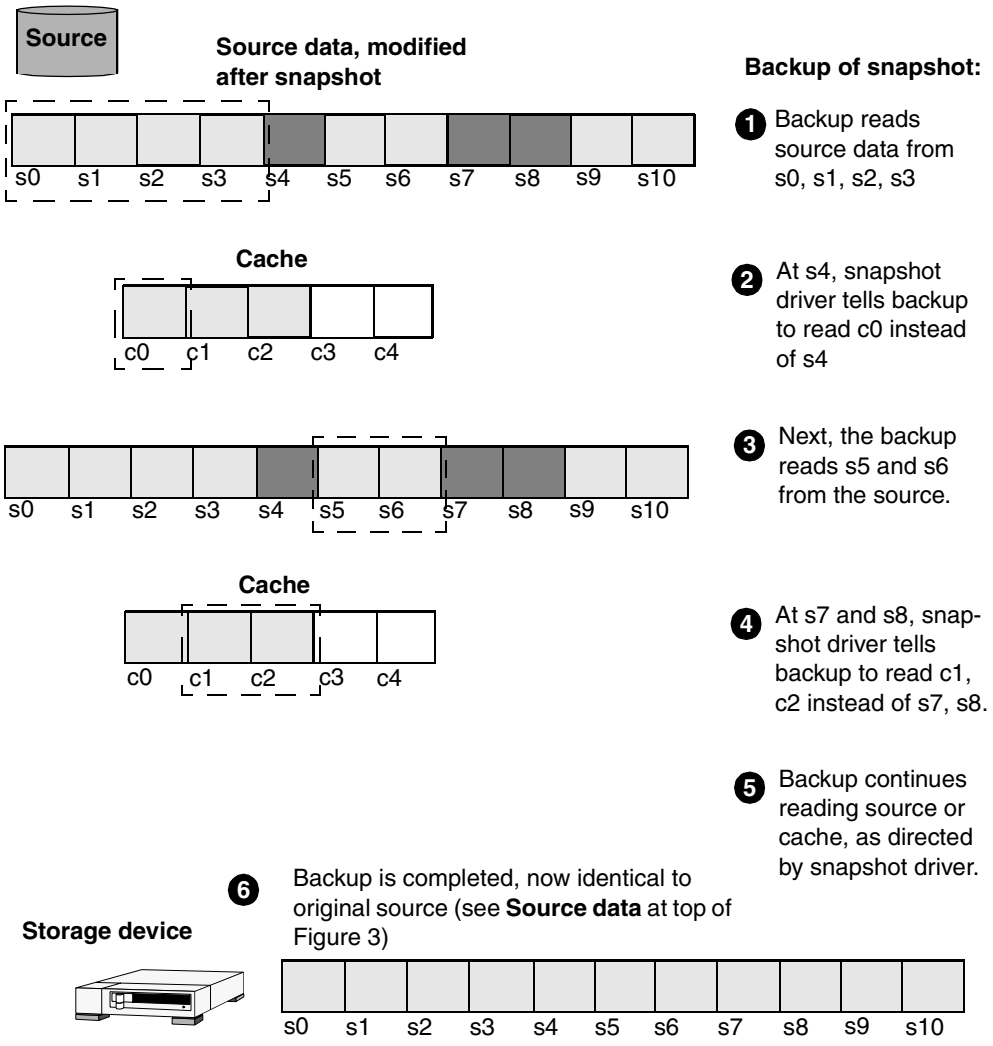
Figure 3. Copy-on-write snapshot process


Source data
s0 s1 s2 s3 s4 s5 s6 s7 s8 s9 s10
1 Image of source data is frozen; snapshot driver is activated
Writes delayed
s0 s1 s2 s3 s4 s5 s6 s7 s8 s9 s10
2 New write requests (represented by arrows) to s4, s7, s8 are held by snapshot driver
Result of snapshot
Snapshot cache
c0 c1 c2 c3 c4
3 Snapshot driver writes contents of blocks s4, s7, and s8 to cache ("copy on write")
Record of cached blocks:
s4 = c0
s7 = c1
s8 = c2
4 Snapshot driver keeps a record of the writes to cache
Source data, modified after snapshot
s0 s1 s2 s3 s4 s5 s6 s7 s8 s9 s10
5 Write requests are now allowed to take place

The immediate results of the snapshot are the following: a cached copy of those portions of the source that were about to change at a certain moment (see step 3 in Figure 3), and a record of where those cached portions (blocks) are stored (4).

The copy-on-write snapshot does not produce a copy of the source; it creates cached copies of the blocks that have changed and a record of their location. By referring to the snapshot, the backup process reassembles the source data on the storage device (see Figure 4).

Figure 4. Backing up a snapshot-type frozen image


Source
Source data, modified after snapshot
s0 s1 s2 s3 s4 s5 s6 s7 s8 s9 s10
Cache
c0 c1 c2 c3 c4
s0 s1 s2 s3 s4 s5 s6 s7 s8 s9 s10
Cache
c0 c1 c2 c3 c4
Storage device
s0 s1 s2 s3 s4 s5 s6 s7 s8 s9 s10
Backup of snapshot:
1 Backup reads source data from s0, s1, s2, s3
2 At s4, snapshot driver tells backup to read c0 instead of s4
3 Next, the backup reads s5 and s6 from the source.
4 At s7 and s8, snapshot driver tells backup to read c1, c2 instead of s7, s8.
5 Backup continues reading source or cache, as directed by snapshot driver.
6 Backup is completed, now identical to original source (see Source data at top of Figure 3)

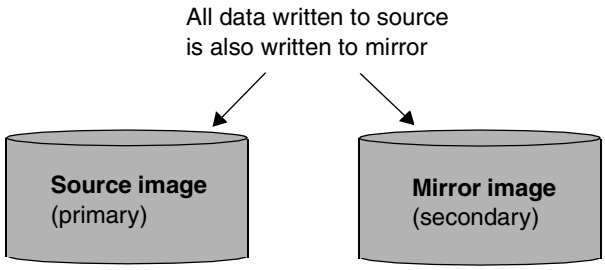
As shown in Figure 4, an accurate backup is obtained by combining the unchanged portions of the source with the snapshot cache. When a backup of the snapshot frozen image begins, the backup application copies the source data ❶ until it comes to a block that changed after the snapshot driver was activated. The snapshot driver tells the backup process to skip that changed block and read in its place the cached (original) copy ❷. The backup application continues copying source data ❸ until it comes to another changed block. Cache is read again ❹ as the snapshot driver dictates. The backup, when finished, is an exact copy of the source as it existed the moment the snapshot driver was activated.

In NetBackup ServerFree Agent, the `nbu_snap` and `fsclone` frozen image methods provide support for copy-on-write snapshot frozen images.

Mirror

Unlike a copy-on-write snapshot, a *mirror* is a complete copy stored on a separate disk, physically independent of the source. Every change or write to the source data on the primary disk is also made to the copy on the secondary disk. This creates a "mirror" image of the source.

Figure 5. Source and mirror images



As in a copy-on-write snapshot, transactions are allowed to finish and new I/O on the source is briefly halted. When the mirror image is brought up-to-date with the source (made identical to it), changes to the source can continue and the mirror image can be backed up. Since mirroring requires an exact, complete copy of the source on a separate device (equal in size to the disk being mirrored), it consumes more disk space than a copy-on-write snapshot.

In NetBackup ServerFree Agent, the vxvm frozen image method provides support for mirror frozen images.

Snapshot vs. Mirror: Which to Choose?

Benefits of copy-on-write snapshot:

- Consumes less disk space: no need for secondary disks containing complete copies of source data.
- May be easier to configure.

Note If cost of the additional disk drives needed for mirroring is prohibitive, choose a copy-on-write snapshot frozen image method (nbu_snap or fsclone). See usage considerations under "Notes on Offhost Backup and Frozen Images" in Chapter 4.

Benefits of mirror:

- Has less impact on the performance of the application or database host being backed up (NetBackup client), because there is no need to run the copy-on-write mechanism.
- Allows faster backups: no need to share disk I/O and network bandwidth, because the backup process reads data from a separate disk (mirror) operating independently of the primary disk that holds the client's source data.

Note If additional disk drives are available and virtual volumes have already been configured with the VERITAS Volume Manager 3.1 or later, choose the vxvm frozen image method. See usage considerations under "Notes on Offhost Backup and Frozen Images" in Chapter 4.

Frozen Image: Process Overview

NetBackup creates a frozen image as follows. (Steps 1, 2, and 6 apply only to transactional databases such as those used with NetBackup for Oracle ServerFree Agent.)

1. Backup process requests application quiesce.
2. Application synchronizes. Must wait for transactions to complete.
3. Lock and flush the file system.
4. Trigger/create the frozen image.
5. Unlock the file system.
6. Release application.
7. Make backup of frozen image.
8. Release frozen image.

Offhost Backup Overview

The primary goal of NetBackup ServerFree Agent is to move I/O processing off the NetBackup client (application host) to an offhost backup agent such as a third-party copy device. The backup agent sends the backup data to the storage device. Since backup agents are unaware of logical organizations of data such as file systems and volume managers, they require the data's physical disk device addresses. This means that NetBackup must "decompose" the backup data from file system or volume addresses to physical addresses. This is accomplished by *mapping* the logical names in the file system or volume manager to absolute physical addresses that can be understood by the backup agent. The mapping information is then transmitted to a NetBackup media server attached to a LAN.

File/Volume Mapping Methods

The mapping methods used by NetBackup ServerFree Agent are installed as part of the NetBackup ServerFree Agent product. When a backup is initiated, the correct mapping method is automatically selected by NetBackup, depending on whether the backup data is configured over physical devices, logical volumes, or file systems.

NetBackup Media Server and Third-Party Copy Device

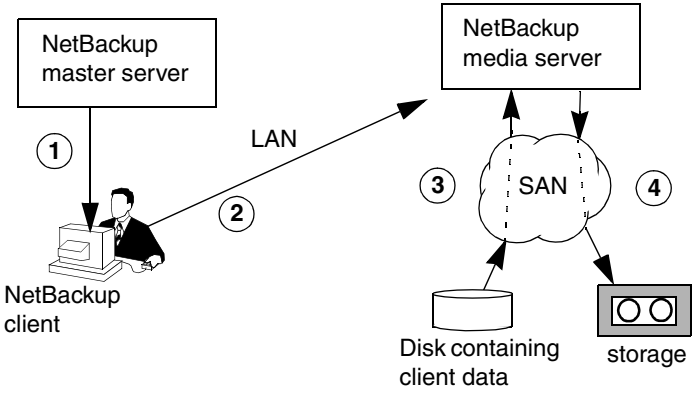
NetBackup ServerFree Agent supports two offhost backup methods: *NetBackup Media Server,* and *Third-Party Copy Device*.

NetBackup Media Server

Choose this option to take advantage of multiple data streams and/or multiplexing (these capabilities are not supported for Third-Party Copy Device).

Figure 6 shows the basic components used in the NetBackup Media Server method. A NetBackup media server handles the backup processing and sends the backup data over Fibre Channel to the storage device.

Figure 6. NetBackup Media Server.



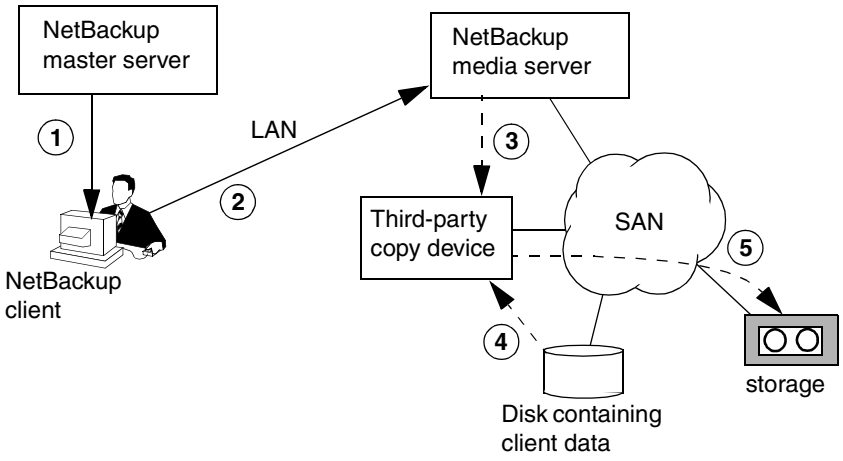
1. On LAN, client backup is initiated by master server, which tells the NetBackup client to map the frozen image data on the disk.
2. On LAN, client sends the mapping information to the media server.
3. Media server processes the backup and reads client data over the SAN, from the addresses specified by the client.
4. Media server sends data across the SAN to storage.

Third-Party Copy Device

Choose this option if processing time on the NetBackup client is critical and off-loading backup processing to a third-party copy device may save time. Note that multiple data streams and multiplexing are not supported.

Figure 7 shows the basic components used in the Third-Party Copy Device method. A third-party copy device (not a component of NetBackup) handles the backup data movement.

Figure 7. Third-Party Copy

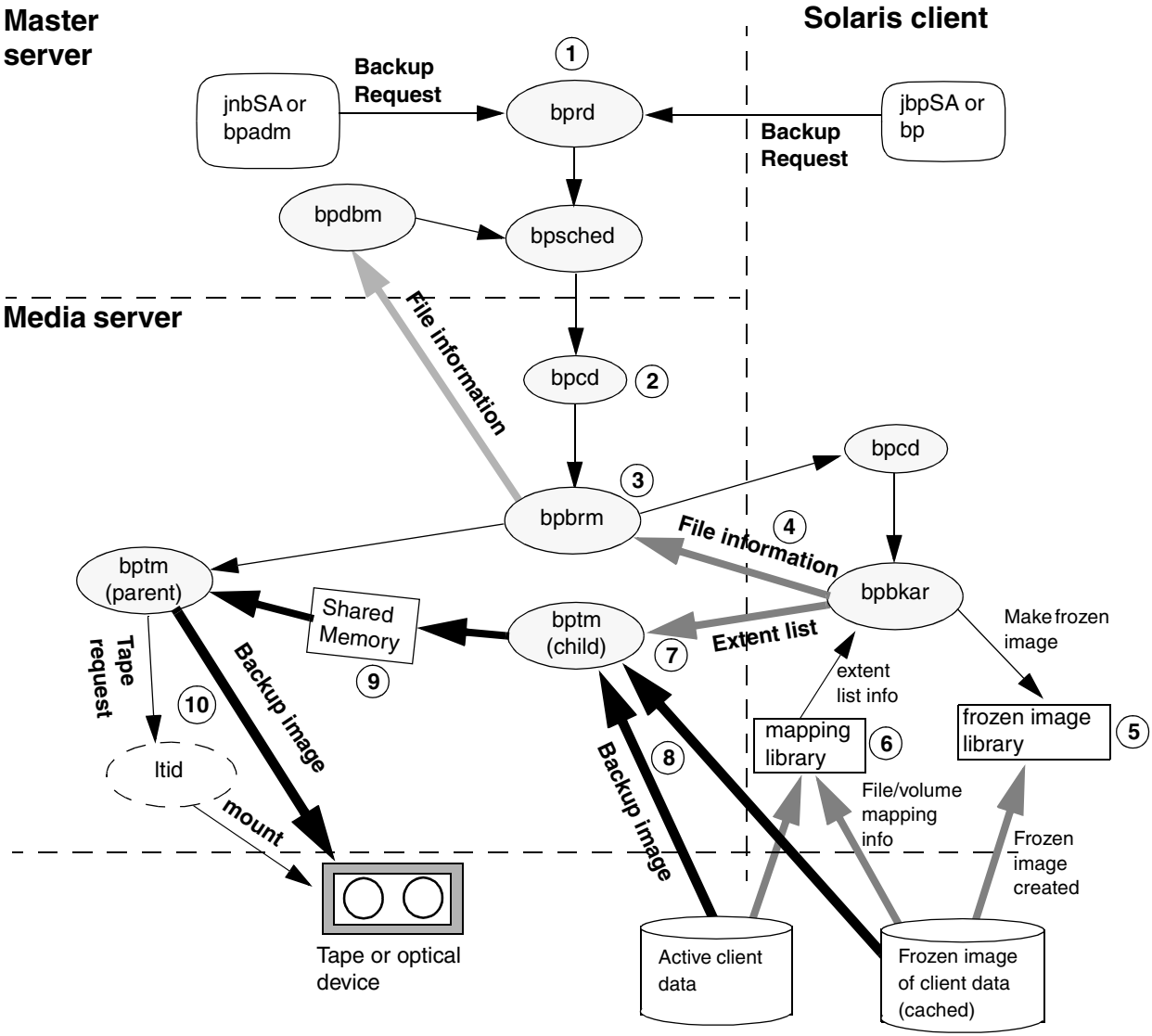


1. On LAN, client backup is initiated by master server, which tells the client to map the frozen image data.
2. On LAN, client sends the mapping information to the media server.
3. Media server sends third-party copy commands to the third-party copy device over the SAN.
4. Third-party copy device reads the client data from the disk over the SAN.
5. Third-party copy device sends data across the SAN to storage device.

NetBackup Media Server: Process Overview

The following diagram shows the major components for making a backup using the NetBackup Media Server method with a copy-on-write snapshot frozen image. Numbers refer to descriptions on the next page.

Figure 8. Process Overview of NetBackup Media Server Backup



1. The NetBackup master server or client initiates the backup, causing the NetBackup request daemon `bprd` to start the scheduler, `bpsched`. `bpsched` processes the class configurations depending on the initiator of the backup (scheduled, immediate manual, or user directed). Refer to Appendix A of the *NetBackup Troubleshooting Guide* for more information on this stage of the backup operation.

2. `bpsched` uses `bpcd` (client daemon) to start the backup/restore manager (`bpbrm`) on the media server.

3. `bpbrm` starts the Media Manager process `bptm` (parent) and also starts the actual backup by using `bpcd` on the client to start the client's backup and archive program `bpbkar`.

4. `bpbkar` sends information about files within the image to the backup/restore manager `bpbrm`, which directs the file information to `bpdbm` for the NetBackup file database on the master server.

5. `bpbkar` requests creation of a frozen image of the client's active data. `bpbkar` uses the frozen image method that was configured for the frozen image source.

6. `bpbkar` requests file/volume mapping information about the client data. `bpbkar` uses one or more mapping libraries to decompose the client's data into physical disk addresses (also referred to as disk *extents*). The file/volume mapping information (list of extents) comes from one of two places: the client's active (primary) data, and from the frozen image of the client data (cached).

7. On the media server, `bptm` creates a child process, which reads the mapping information (extent list) from `bpbkar`.

8. Based on the extent list received from `bpbkar`, `bptm` reads the client data (backup image) from two places: from the client's active data (for those blocks that have *not* changed since the backup was initiated), and from the frozen image cache (to obtain the original contents of the blocks that *have* changed since the backup was initiated).

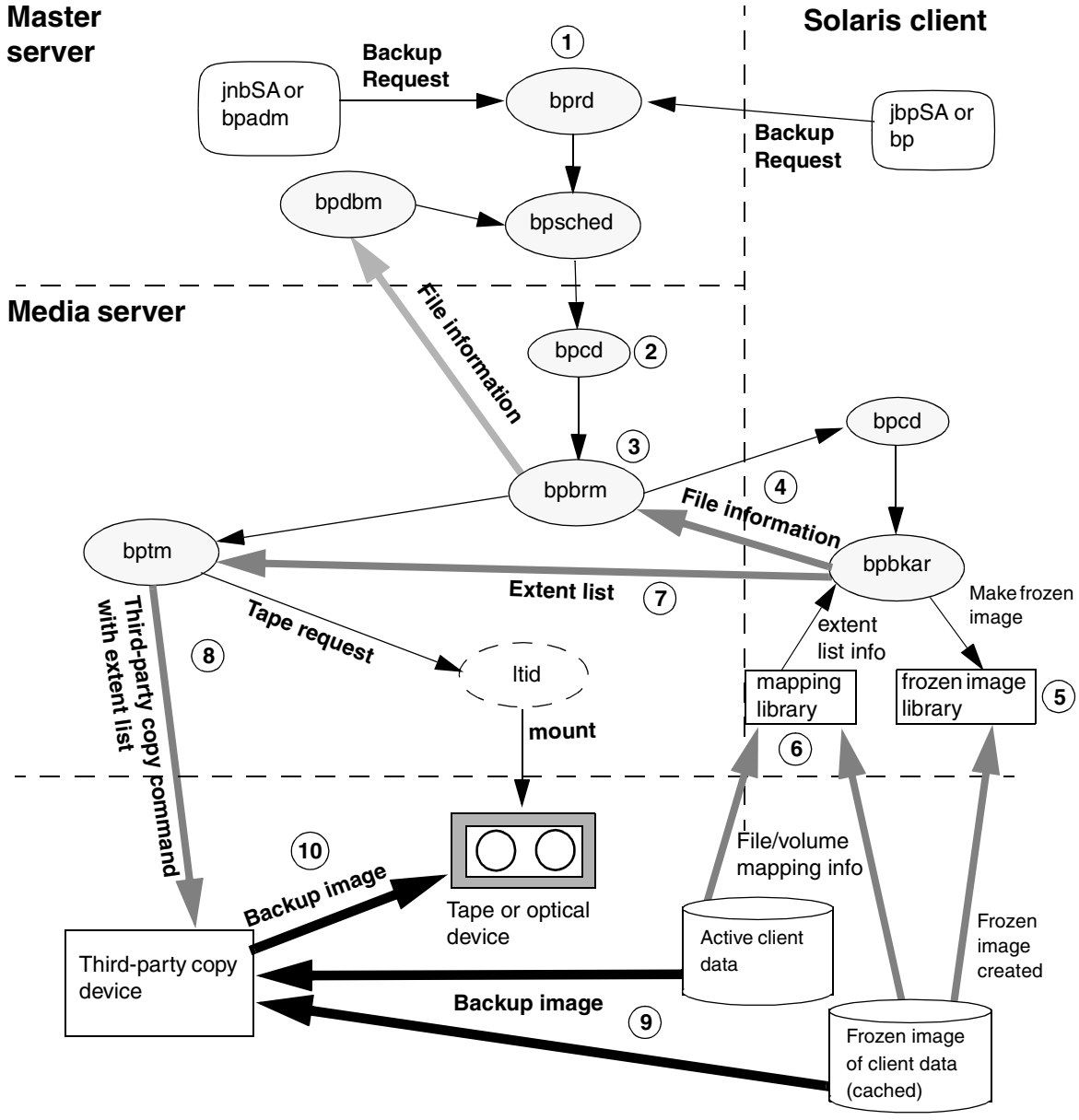
9. The `bptm` child stores the client data block-by-block in shared memory.

10. The parent `bptm` process then takes the backup image from shared memory and sends it to the storage device. For information on how the tape request is issued, refer to Appendix A of the *NetBackup Troubleshooting Guide*.

Third-Party Copy Device: Process Overview

The following diagram shows the major components for making a backup using the NetBackup Third-Party Copy Device method with a copy-on-write snapshot frozen image. Numbers refer to descriptions on the next page.

Figure 9. Process Overview of Third-Party Copy Device Backup



1. The NetBackup server or client initiates the backup, causing the NetBackup request daemon `bprd` to start the scheduler, `bpsched`. `bpsched` processes the class configurations depending on the initiator of the backup (scheduled, immediate manual, or user directed). Refer to Appendix A of the *NetBackup Troubleshooting Guide* for more information on this stage of the backup operation.

2. `bpsched` uses `bpcd` (client daemon) to start the backup/restore manager (`bpbrm`) on the media server.

3. `bpbrm` starts the Media Manager process `bptm` and also starts the actual backup by using `bpcd` on the client to start the client's backup and archive program `bpbkar`.

4. `bpbkar` sends information about files within the image to the backup/restore manager `bpbrm`, which directs the file information to the NetBackup file database on the master server.

5. `bpbkar` requests creation of a frozen image of the client's active data, by means of the frozen image library. `bpbkar` uses the frozen image method that was configured for the frozen image source.

6. `bpbkar` requests file/volume mapping information about the client data. `bpbkar` uses one or more mapping libraries to decompose the client's data into physical disk addresses (also referred to as disk *extents*). This file/volume mapping information (list of extents) comes from one of two sources: the client's active (primary) data, or from the frozen image of the client data (cached).

7. `bptm` reads the mapping information (extent list) from `bpbkar`.

8. `bptm` sends the third-party copy command with the extent list to the third-party copy device. For information on how the tape request is issued, refer to Appendix A of the *NetBackup Troubleshooting Guide*.

9. The third-party copy device reads the backup image (client data) from two places: from the client's active data (for those blocks that have *not* changed since the backup was initiated), and from the frozen image cache (for the original contents of the blocks that *have* changed since the backup was initiated).

10. The third-party copy device sends the backup image to the storage device.

NetBackup 4.0V ServerFree Agent System Administrator's Guide for Solaris

Hardware Configuration 2

To take advantage of the offhost backup feature in NetBackup ServerFree Agent, you must configure a SAN environment of switches, hubs, and optional third-party copy devices, and attach and properly configure robots and drives.

The information in this chapter is intended for seasoned NetBackup administrators who have experience with SAN configurations. In addition to this chapter, you may need the documentation provided with your network equipment.

This chapter covers the following topics:

- General Procedure
- Solaris Configuration
- Example Configuration Matrix
- Fibre Channel Mapping Examples
- Example Fibre Channel Configuration with Chaparral Router
- Hardware Verification

Note In this chapter, third-party copy devices are referred to as *routers* or *bridges*. The terms vary, depending on the vendor and the nature of the device. See the "Terminology" section of Chapter 1 for a definition of third-party copy device and bridge.

General Procedure

The following is an overview of the hardware configuration procedure for a NetBackup Media Server. Some of these steps may be optional depending on your hardware configuration.

Familiarity with the hardware and various vendor configuration tools will help you accomplish these steps.

See "Example Fibre Channel Configuration with Chaparral Router" on page 32 for a more detailed example of configuring hardware on a Solaris host.

- Determine the physical location of each drive within the robot.

TechNote 233390

Note This task may not be needed if you are able to use device discovery (a part of the NetBackup Device Configuration wizard).

This is usually shown on the connectors to the drives or in the vendor's documentation. The robot and slot layout appendix in the *Media Manager System Administrator's Guide - UNIX* shows the layout for many robots. For the robot types supported by NetBackup 4.0V ServerFree Agent, refer to Chapter 2 of the *NetBackup 4.0V Release Notes*.

- Make all drive and robot hardware connections.
- Install any SAN hardware, such as bridges or routers, switches, and hubs.
- Determine the SCSI-ID-to-fibre-channel-lun mapping for your tape devices (if fibre is part of your configuration and you are using a SCSI-to-fibre bridge or router).

  Hard-wired SCSI IDs are converted to fibre channel luns. Understanding which luns map to which physical SCSI IDs will ensure correct drive assignments. See "Fibre Channel Mapping Examples" on page 30.
- Record the physical configuration.

  It is helpful to record your hardware information. Record the adapter, SCSI addresses, and fibre channel luns to which you connected each drive. It is also useful to record the version levels of firmware and drivers. See "Example Configuration Matrix" on page 29 and "Fibre Channel Mapping Examples" on page 30.
- Install and configure any appropriate drivers.

  See your vendor documentation for instructions.

- On UNIX hosts, create any required device files.

  TechNote 235522

  Create the device files for each tape and disk drive based on the fibre channel LUNs of the drives and adapters (explained under "Configuration Steps" on page 33). Add the name of the device file to your notes to complete the correlation between device files and physical drive location.

  Use the *NetBackup Media Manager Device Configuration Guide* and the man pages that are available with the operating system.

- Customize the Solaris operating system by modifying the appropriate system configuration files. This task requires knowledge of the system files that influence device file creation and use.

  TechNote 233952

  You may need to modify the sg driver files. See the *NetBackup Media Manager Device Configuration Guide*.

- Use the interface available for each piece of hardware to ensure that the configuration is correct.

  Use the following order to configure and verify the hardware (start with the robot and shared drives and work back to the host):

  a. Tape robotics and drives TechNote 234175

  b. Bridges and routers

  c. Hub or switches

  d. Solaris servers

- If you experience errors during the installation and configuration of your devices and you suspect that your Solaris configuration is causing problems, refer to the operating system logs as described in your operating system documentation.

Media Manager Device Configuration Guide

See the *NetBackup Media Manager Device Configuration Guide* for information on installing and configuring drivers, and modifying the appropriate system configuration files.

Solaris Configuration

- Setting the bit to disable SCSI reserve/release in entries for the `st.conf` file corrects a known Solaris problem (for more information on SCSI reserve/release, see the man page for `st`). Some of the examples in the *NetBackup Media Manager Device Configuration Guide* do not have this bit set, since this problem has been addressed in a recent patch from Solaris.
- See the Sun/SPARC chapter of the *NetBackup Media Manager Device Configuration Guide* for information about modifications needed in the sg driver configuration to detect SCSI luns greater than 1 and SCSI targets greater than 7. This change is often needed for fibre-attached devices.
- Minimize the number of entries in the `sg.conf` file to minimize boot and `sgscan` time.

Note The `st.conf` and `sg.conf` files are created during installation of NetBackup Media Manager, at step 5 on page 35.

Example Configuration Matrix

It may be helpful to record your physical configuration. You can complete a matrix similar to the following.

1	2	3	4	5	6	7
Physical Definition	**Physical SCSI ID At Library**	**Physical Bus ID At Switch**	**Logical Fibre Channel To LUN Mapping**	**Device Name On UNIX Host**	**Pass-thru Path On Solaris Host**	**Logical NetBackup Storage Unit Name**

In column ...	Identify and record the ...
1	Equipment type.
2	Physical SCSI ID of each piece of equipment.
3	Physical bus number where the equipment is attached.
4	SCSI-to-LUN mapping assignments. Log into the bridge to obtain these mappings.
5	Device path used by the UNIX host.
6	Pass-thru path used by sg driver.
7	Logical storage unit name used by NetBackup.

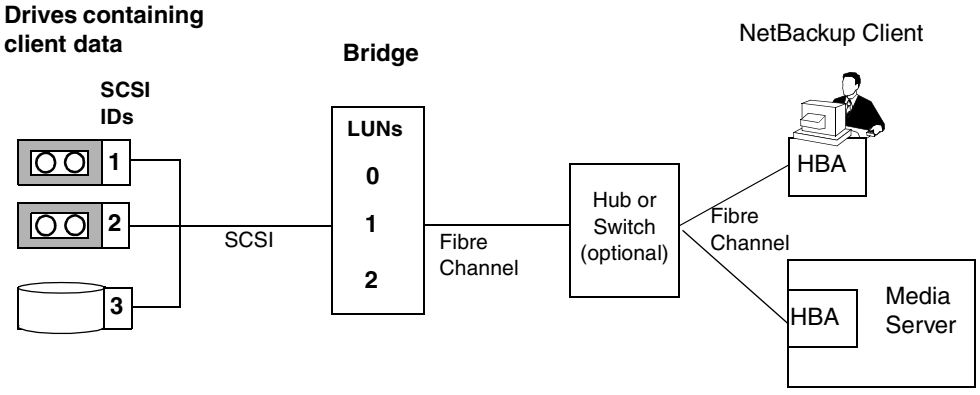
Fibre Channel Mapping Examples

The following examples contain SCSI-to-fibre bridges and show the SCSI-to-fibre-channel mappings in various configurations. In these examples:

- HBA is a host bus adapter.
- FC LUN is a fibre-channel lun.
- The UNIX pass-through paths do not need to start at c0. The paths shown are only examples and can be any adapter number. These paths are used when configuring the NetBackup sg driver on Solaris hosts.

Example 1

This example consists of two tape drives, a disk drive, a SCSI-to-fibre bridge, a hub or switch, and a host bus adapter (HBA) on the NetBackup client.



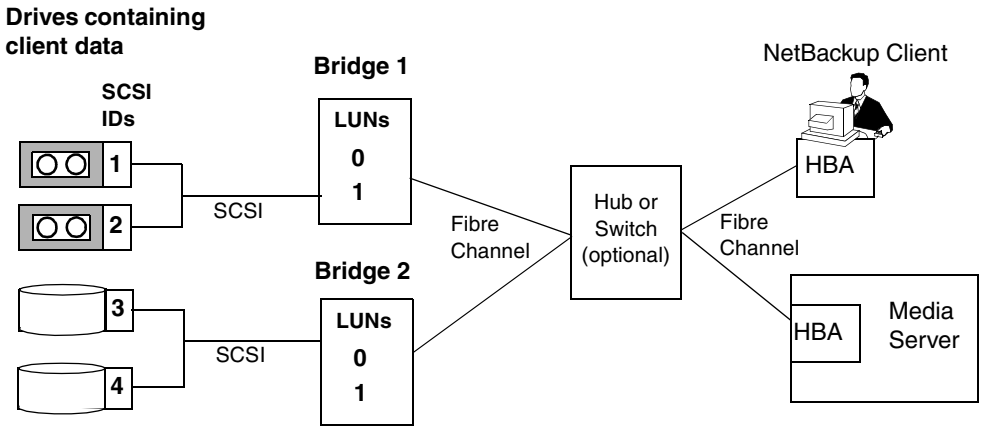
The following table shows the device names and the device paths that you would use when configuring the drives in this example:

Table 2. One Bridge - One HBA

SCSI ID	FC LUN	SCSI Coordinates (Port Bus Target LUN)	Device Path (UNIX)	Pass-thru Path (Solaris)
1	0	0 0 0 0	/dev/rmt/0cbn	/dev/sg/c0t0l0
2	1	0 0 0 1	/dev/rmt/1cbn	/dev/sg/c0t0l1
3	2	0 0 0 2	/dev/rdsk/c0t0l2	/dev/sg/c0t0l2

Example 2

This example includes two tape drives, two disks, two SCSI-to-fibre bridges, a hub or switch, and a host bus adapter (HBA) on the client. The operating system discovered bridge 1 first. SCSI IDs 1 and 2 are on bridge 1; SCSI IDs 3 and 4 are on bridge 2.



The following table shows the device names and the device paths that you would use when configuring the drives in this example:

Table 3. Two Bridges, One HBA; Bridge 1 Discovered First

SCSI ID	FC LUN	SCSI Coordinates (Port Bus Target LUN)	Device Path (UNIX)	Pass-thru Path (Solaris)
1	0	0 0 0 0	/dev/rmt/0cbn	/dev/sg/c0t0l0
2	1	0 0 0 1	/dev/rmt/1cbn	/dev/sg/c0t0l1
3	0	0 0 1 0	/dev/rdsk/c0t1l0	/dev/sg/c0t1l0
4	1	0 0 1 1	/dev/rdsk/c0t1l1	/dev/sg/c0t1l1

For further examples, refer to the *NetBackup SAN Shared Storage Option System Administrator's Guide*.

Example Fibre Channel Configuration with Chaparral Router

Hardware Components in This Example

- Solaris 2.6 or 2.7 host
- JNI HBA
- Brocade 2400 switch
- Chaparral FS1310 Fibre Channel-to-SCSI Router
- HP SureStore 718 tape library

Files Changed in This Example

NetBackup

- `/usr/openv/volmgr/bin/driver/sg.conf`
- `/usr/openv/volmgr/bin/driver/sg.links`

Operating System

- `/kernel/drv/st.conf`

HBA-Specific

The actual file depends on which HBA driver is used.

- `/kernel/drv/fca(w).conf`

Configuration Steps

1. Use a serial or telnet connection to the Chaparral router to confirm that the router can see the robot controller and all the drives. Use the Display Devices option under the System Menu on the Chaparral FS1310.

```
================================================================================
|                 Chaparral FC-to-SCSI Router Administrator                    |
================================================================================

       ====================Display Devices============================
       | Ch 1  Id 01  Lun 00  DevType 00  SEAGATE  ST39175LW          |
       | Ch 2  Id 00  Lun 00  DevType 01  QUANTUM  DLT7000            |
       | Ch 2  Id 01  Lun 00  DevType 08  HP       C6280-7000         |
       ===============================================================

==================Menu Selection Help=========================================
| Use this option to view the devices that are connected to the router.      |
|                                                                            |
| SPECIAL KEYS:               Arrow Keys or Hot Key = Select menu item       |
| CTRL-A = ANSI/VT100 toggle  CTRL-E = Next screen  CTRL-R = Refresh terminal|
| CTRL-B = Color toggle       CTRL-H = Help toggle  CTRL-Z = Esc = Quit menu  |
================================================================================
Board Temp:  43øF (  6øC)                          Wed Oct 25 13:17:21 2000
```

2. Display the SCSI-to-fibre-channel mapping on the Chaparral router. Go to Address Mapping under the System Menu and select the Display Address Map option.

```
================================================================================
|                 Chaparral FC-to-SCSI Router Administrator                    |
================================================================================

    ==========================Display Address Map==========================
    | FC LUN 00  maps to           hard  CNSi     FS1310            fixed |
    | FC LUN 01  maps to  SCSI 01:01:00  SEAGATE  ST39175LW         fixed |
    | FC LUN 04  maps to  SCSI 02:00:00  QUANTUM  DLT7000           fixed |
    | FC LUN 05  maps to  SCSI 02:01:00  HP       C6280-7000        fixed |
    ========================================================================

                      =========================

==============================Menu Selection Help===============================
| Use this option to display the listing of the router and all devices in    |
| the order of their assigned FC LUN; and to change the device LUN by        |
| selecting the device and pressing Enter key.  The mapping is between the   |
| FC LUN and the device ID (Channel number:SCSI ID:LUN).                     |
| Note:  To change the FC LUNs, set mapping mode to FIXED!                   |
================================================================================
Board Temp:  43øF (  6øC)                          Wed Oct 25 13:18:55 2000
```

3. Display the Loop ID for the router in order to determine the target number that will be used on the host for the devices connected to the router. In the example display below, the target number (Loop ID) is 6.

   Use the CTRL-E key to page through the status displays made available by the Chaparral FS1310.

```
================================================================================
|                  Chaparral FC-to-SCSI Router Administrator                   |
================================================================================
HOST    Topology = Private Loop
        Node WWN = 1000005013B05497
        Port WWN = 2000005013B05497
        Loop ID:       6
        FC Addr = 0000DC  AL_PA =       DC
        Router LUN:    0
CHAN 0  Initiator ID:  7  Ultra/U2:     ON
        Termination:  ON  Term Power:   ON
CHAN 1  Initiator ID:  7  Ultra/U2:     ON
        Termination:  ON  Term Power:   ON
CHAN 2  Initiator ID:  7  Ultra/U2:     ON
        Termination:  ON  Term Power:   ON
ROUTER  Alarm:   ENABLED  Scan Delay:    0  ExtCopy: ENABLED
        MappingMd: FIXED  AddrMethod:  PDA
  CAPI  Version =    2.7
FC LIB  Version =   3.66

================================================================================
| CFG Info:   Use up/down arrows, PageUp, PageDown, End, Home, Dump, ESC       |
================================================================================
Board Temp:  43øF (  6øC)                          Wed Oct 25 14:07:47 2000
```

4. Bind the world-wide name (wwn) for the device to the target number. The world wide name of the router can be found on the router itself or in the boot-time messages that are written to the `/var/adm/messages` log on the NetBackup Media Server.

   The binding procedure is HBA-vendor specific. JNI adapters can be configured using ezfibre (a JNI product). Other HBAs can be configured by adding entries in their respective `.conf` files.

   For this example, assume the router is bound to target 6. The `/kernel/drv/fcaw.conf` file would have the following entries created by ezfibre:

```
name="fcaw" parent="/sbus@1f,0"
reg=1, 0x0, 8000, 1, 0x8000, 8000, 1, 0x10000, 2, 1, 0x20000,
      4, 1, 0x30000, 200
target6_wwnn="1000005013B05497"
target6_hba="fcaw0"
def_hba_binding="null";
```

5. From the NetBackup 4.0V CD-ROM, install NetBackup Media Manager software by choosing the NetBackup option from the `./install` script. (NetBackup installation is described in the *NetBackup DataCenter 3.4 Installation Guide - UNIX*.) You need NetBackup Media Manager in order to use some of the files and commands described in the following steps.

6. As shown in step 2, for each of the FC (fibre channel) luns with the matching SCSI bus, target, and lun values that the router displays (such as `SCSI 02:00:00 for FC LUN 04)`, add entries in the `/usr/openv/volmgr/bin/driver/sg.links` file so that the necessary `/dev/sg/*` nodes are created.

   For the devices in this example, fibre channel luns 1, 4, and 5 are needed for target (Loop ID) 6.

   Note that the target and luns in the address part of the `sg.links` entries are hexadecimal, but are decimal in the `sg/c\N0tmln` part of the entries. Also, make sure that there are tabs between the columns, not spaces.

```
type=ddi_pseudo;name=sg;addr=6,1;       sg/c\N0t6l1
type=ddi_pseudo;name=sg;addr=6,4;       sg/c\N0t6l4
type=ddi_pseudo;name=sg;addr=6,5;       sg/c\N0t6l5
```

7. Add additional target and lun entries to the `/usr/openv/volmgr/bin/driver/sg.conf` file.

```
name="sg" class="scsi" target=6 lun=1;
name="sg" class="scsi" target=6 lun=4;
name="sg" class="scsi" target=6 lun=5;
```

8. In the `/kernel/drv/st.conf` file, do the following:

   a. Add (or un-comment) the appropriate drive entries in the `tape-config-list` section.

```
tape-config-list =
"DEC     TZ89",          "DEC DLT",              "DLT7k-data";
```

   b. Then add (un-comment) the matching `data-property-name` entry:

```
DLT7k-data = 1,0x38,0,0x39639,4,0x82,0x83,0x84,0x85,2;
```

9. For each tape drive, add a `name` entry to the `st.conf` file.

   Here is an example `name` entry:

```
name="st" class="scsi" target=6 lun=1;
```

   Make sure you have entries for all target and bus combinations for each device.

10. Remove the old `sg.conf` file:

    ```
    rm -r /kernal/drv/sg.conf
    ```

11. Run the `/usr/openv/volmgr/bin/driver/sg.install` script to copy the files into the correct locations.

12. Copy the `sg.links` and `sg.conf` files (in `/usr/openv/volmgr/bin/driver`) to another location, for future reference. Whenever NetBackup is re-installed, these files in `/usr/openv/volmgr/bin/driver` are overwritten.

13. Use `boot -r` to reboot the operating system.

14. Use `/usr/openv/volmgr/bin/sgscan` to display the devices.

Hardware Verification

Perform the following steps to ensure that the hardware and operating system are functioning correctly.

Note These steps should be considered a prerequisite to configuring NetBackup 4.0V. If your hardware devices are not functioning correctly, NetBackup 4.0V cannot operate.

1. Install the hardware and connect the external equipment according to the manufacturers' specifications.

2. Power up the hardware starting at the furthest point from the host(s). Watch for any malfunction as indicated by front panel LEDs or readouts, if available.

   a. Turn on tape and disk drives first.

   b. If the tape/disk drives are okay, turn on the bridge/router (such as the Chaparral router or Pathlight SAN Gateway).

   c. If the router/bridge device is okay, turn on the hub or switch device.

   d. If the hub/switch is okay, turn on the hosts.

3. Install drivers for the host bus adapters according to the supported hardware configuration matrix on all SAN systems.

4. Perform the configuration of the router/bridge and confirm the following:

- target and lun allocations (refer to step 2 on page 33)
- extended copy software support (for the third-party copy feature; refer to the documentation that came with the router/bridge)
- IP address setting of the router/bridge, if it supports a telnet connection (refer to the documentation that came with the device)

5. Check the following on the switch:
   - The port types (for example, loop vs. fabric)
   - IP address setting of the switch, if it supports a telnet connection (refer to the documentation that came with the switch)

6. Perform the configuration of the host bus adapters and confirm that the operating system recognizes the luns by performing a "reconfiguration" reboot to create the device files (step 13 and step 14 in the previous procedure).

7. After installing NetBackup 4.0V and ServerFree Agent software, perform an `sgscan`. Check for proper output and recognition of devices.

   Here is sample output from `sgscan`:

   ```
   barney# sgscan
   /dev/sg/c0t6l1: Disk (/dev/rdsk/c1t6d1): "SEAGATE ST39175LW"
   /dev/sg/c0t6l4: Tape (/dev/rmt/2): "QUANTUM DLT7000"
   /dev/sg/c0t6l5: Changer: "HP      C6280-7000"
   ```

8. Use the following commands to verify the functionality of all of the SAN equipment at a system level:

   For tape drives:

   ```
   mt -f /dev/rmt/device_name status
   ```

   For disk drives:

   ```
   prtvtoc /dev/rdsk/* | more
   ```

9. Once the equipment has been discovered, set the addresses to FIXED at the router/bridge so that they will not change when the equipment is reset.

NetBackup 4.0V ServerFree Agent System Administrator's Guide for Solaris

Installation 3

This chapter explains how to install NetBackup 4.0V ServerFree Agent software on Solaris systems.

Prerequisites

The Solaris master server and clients must be running Solaris 2.6, 7, or 8.

Installing NetBackup ServerFree Agent

Loading From Media

1. Log in as root on the NetBackup master server.
2. Insert the CD-ROM.
3. Change your working directory to the CD-ROM directory:

   ```
   cd /cd_rom_directory
   ```

   Where *cd_rom_directory* is the path to the directory where you can access the CD-ROM. It may be necessary to mount this directory.
4. To install NetBackup 4.0V software on the NetBackup master server and clients, execute the following:

   ```
   ./install
   ```

   The Installation Options menu appears.
5. Select NetBackup and install NetBackup 4.0V software on the master server and clients as described in the *NetBackup DataCenter 3.4 Installation Guide - UNIX*.

6. In a separate window, make sure a valid license key for NetBackup ServerFree Agent has been installed. To do this, enter the following command to list and add keys:

   ```
   /usr/openv/netbackup/bin/admincmd/get_license_key
   ```

7. When the NetBackup 4.0V master server installation is complete, the Installation Options menu reappears. To install NetBackup ServerFree Agent on the NetBackup master server, select NetBackup Add-On Product Software.

   A second menu appears.

   - At a minimum, you must select the NetBackup ServerFree Agent option. To use the features of NetBackup 4.0V with a FlashBackup class, you must also select NetBackup FlashBackup (this installs the 4.0V version of FlashBackup). For additional FlashBackup installation instructions, see "Restrictions on NetBackup Class Attributes" in Chapter 3 of the *NetBackup 4.0V Release Notes*.

Note If you do NOT plan to use NetBackup 4.0V with the FlashBackup class type, there is no need to select NetBackup FlashBackup. Note, in addition, that the snap driver (for this 4.0V release) is included in the core NetBackup software, not in FlashBackup.

   - To install both FlashBackup for 4.0V and NetBackup ServerFree Agent, select Install All Add-On Products.

8. Enter **q** to quit selecting options. When asked if the list is correct, answer **y**.

NetBackup ServerFree Agent software is installed in

```
/usr/openv/netbackup/vfms/Solaris/os/version/
```

Where:

- *os* is Solaris 2.6, Solaris 7, or Solaris 8
- *version* is a six digit number representing the NetBackup version

Installing NetBackup 4.0V on Clients

You must install NetBackup 4.0V (DataCenter) client software on the clients before performing the next procedure. For instructions, refer to page 11 of the *NetBackup DataCenter 3.4 Installation Guide - UNIX*.

Distributing ServerFree Agent Software to Clients

Next, you must install the ServerFree Agent software on your Solaris clients. Note: you should also perform this procedure if you are doing either of the following:

- Installing a software upgrade (patch)
- Reinstalling ServerFree Agent software on a Solaris client

Execute the following as the root user on the NetBackup 4.0V master server.

1. Check whether `bprd` is running by executing:

   `/usr/openv/netbackup/bin/bpps`

   If only one `bprd` shows up in the `bpps` output, there are no active backups or restores. In that case, terminate the `bprd` daemon by executing:

   `/usr/openv/netbackup/bin/admincmd/bprdreq -terminate`

   If more than one `bprd` appears, wait until the backups and/or restores are complete and then run the `/usr/openv/netbackup/bin/bpps` command again. When only one `bprd` shows up, terminate the `bprd` daemon.

2. To distribute the ServerFree Agent software to Solaris clients, first create a file that lists the clients. For each client, enter a line in this file containing the following three parameters:

   hardware_type operating_system clientname

   For example:

   ```
   Solaris Solaris2.6 mysparc
   ```

   or

   ```
   Solaris Solaris7 othersparc
   ```

   or

   ```
   Solaris Solaris8 othersparc
   ```

3. Distribute the ServerFree Agent software to clients by executing the following command (all on one line):

`/usr/openv/netbackup/bin/update_clients -Install_VFMS -ClientList` ***file***

Where *file* is the name of the file that you created in the previous step.

Note ServerFree Agent software cannot be distributed to clients by means of the Backup Policy Management utility in the NetBackup Administration interface.

4. Start the NetBackup daemon as the root user on the master server by executing:

```
/usr/openv/netbackup/bin/initbprd
```

If you are installing NetBackup ServerFree Agent for the first time, go to Chapter 4 to begin configuring NetBackup ServerFree Agent software.

De-installing NetBackup ServerFree Agent

Server Deinstall

On the master server where you initially loaded the NetBackup ServerFree Agent software, do the following:

1. Check the Activity Monitor in the NetBackup Java Administration interface to make sure no NetBackup ServerFree Agent backups are active or running (the State field should read `Done`).

2. If you installed the NetBackup ServerFree Agent package, execute:

```
pkgrm SUNWnbsfa
```

Client Deinstall

1. On the master server, check the Activity Monitor in the NetBackup Java Administration interface to make sure no NetBackup ServerFree Agent backups are active or running for the client (the State field should read `Done`).

2. Execute the following command to deinstall the NetBackup ServerFree Agent software on the client:

```
/usr/openv/netbackup/bin/install_vfms -d
```

Note Do NOT do the following if your NetBackup installation also includes FlashBackup. The following procedure removes the snapshot software; FlashBackup, however, requires the snapshot software.

---

3. Remove the snap driver by executing the following on the client:

```
/usr/sbin/rem_drv snapctl
rm -rf /dev/rdsk/snap /dev/dsk/snap
rm -f /usr/kernel/drv/snapctl
rm -f /usr/kernel/drv/snapctl.conf
```

If the client is running Solaris 7 or 8, also execute the following:

```
rm -f /usr/kernel/drv/sparcv9/snapctl
```

NetBackup 4.0V ServerFree Agent System Administrator's Guide for Solaris

NetBackup Configuration 4

This chapter explains how to configure NetBackup ServerFree Agent for making frozen images and offhost backups. For a detailed discussion of general NetBackup configuration (apart from ServerFree Agent issues), see the *NetBackup DataCenter System Administrator's Guide - UNIX*.

The following topics are covered in this chapter:

- Prerequisites
- Configuration at a Glance
- Configuring a Backup Method
- Configuring a Frozen Image Method
- Notes on Offhost Backup and Frozen Images
- Creating Configuration Files for Offhost Backup

Prerequisites

Before proceeding with this chapter, make sure the following have been completed.

- NetBackup 4.0V with the ServerFree Agent add-on must be installed on server and clients. Refer to Chapter 3, "Installation," for instructions.
- For the offhost backup feature, a fibre channel network must be configured. Refer to Chapter 2, "Hardware Configuration."
- TechNote 230320 Configure storage devices (you can use the Device Configuration wizard).
- Create a class with a backup schedule, and specify the client and files to back up (file list). Be sure to specify the client type as Solaris. (If you use the Backup Policy Configuration wizard, see the note on page 56.)
- Create the following troubleshooting directories: `online_util`, `bpbkar`, and `bptm` (use an access mode of 777):

  `/usr/openv/netbackup/logs/online_util` (on the NetBackup client)

  `/usr/openv/netbackup/logs/bpbkar` (on the NetBackup client)

  `/usr/openv/netbackup/logs/bptm` (on the NetBackup media server)

Configuration at a Glance

The configuration procedures in this chapter do the following:

1. Help you choose an offhost backup method (no offhost backup is called Local Host). Note that the backup method is a *class* attribute.

2. Help you choose a frozen image method. The frozen image method is configured for a particular *client*, not for a class.

Note Use of a frozen image method does not require offhost backup. You can use a frozen image method, for instance, to capture a frozen image of a locally available database.

3. Help you create configuration files required for offhost backup.

Configuring a Backup Method

This procedure explains how to select a backup method for an existing NetBackup class.

Note A disk device that cannot return its SCSI serial number in response to a serial-number inquiry (serialization) cannot be used for offhost backup.

1. Start the NetBackup Administration interface by entering the following:

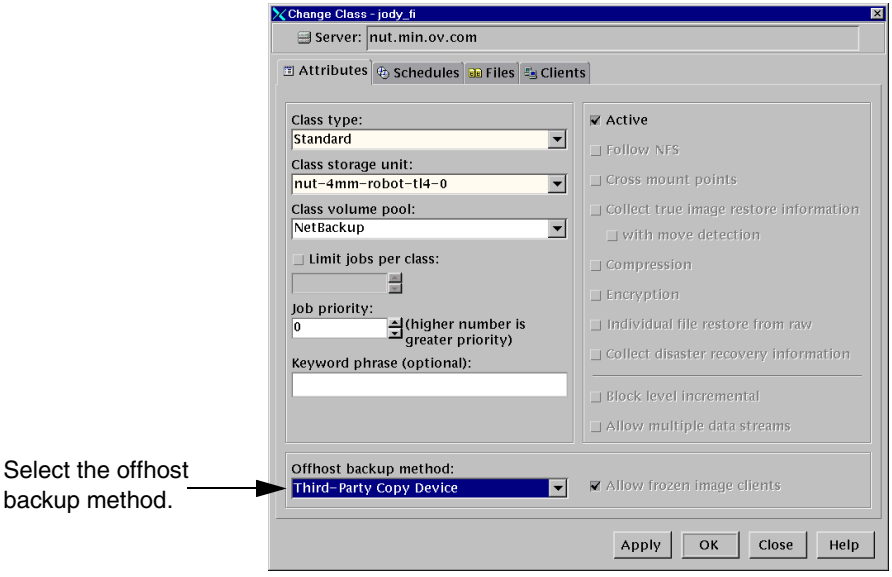
   `/usr/openv/netbackup/bin/jnbSA &`

2. Start the Backup Policy Management utility.

   The Backup Policy Management window appears.

3. In the left pane, double click on the class.

   The Change Class dialog appears, showing the Attributes tab.



4. Choose a backup method from the Offhost backup method pull-down menu. If you are configuring a traditional backup (one that does not require offhost backup), select Local Host.

These are the options for backup method:

Local Host

This option means no offhost backup. The backup will be done by the NetBackup client. If the NetBackup ServerFree Agent software is not installed, Local Host is displayed and the offhost backup menu is greyed out.

NetBackup Media Server

Backup processing will be handled offhost, by a NetBackup media server.

Third-Party Copy Device

Backup processing will be handled offhost, by a third-party copy device.

5. If you selected Third-Party Copy Device or NetBackup Media Server as the backup method, specify a particular class storage unit in the Class storage unit pull-down menu. Do not select Any_available.

6. If you selected Local Host in step 4 and you want to use a frozen image method, place a check mark beside Allow frozen image clients.

7. To save these settings, click Apply.

8. If not already done, click the Schedules tab to define an appropriate schedule for the class.

9. If not already done, click the Files tab to specify the files to be backed up (this defines the class *file list*).

   Options for the class schedule and file list are described in the *NetBackup DataCenter System Administrator's Guide*. These are standard NetBackup features, not new in the 4.0V release.

10. If you selected Allow frozen image clients or an offhost backup method (Third-Party Copy Device or NetBackup Media Server), you must configure a frozen image method. See "Configuring a Frozen Image Method" on page 49. Begin at step 4.

11. If you selected an offhost backup method (Third-Party Copy Device or NetBackup Media Server), you must also create configuration files. See "Creating Configuration Files for Offhost Backup" on page 58.

Configuring a Frozen Image Method

This procedure explains how to configure a frozen image method. You must do this if either of the following apply:

- You chose an offhost backup method in the previous procedure.
- You selected Allow frozen image clients to capture a frozen image of locally available data (not offhost).

This procedure involves designating a *frozen image source*, which is usually a file system containing the files that are specified in the file list. (Two examples are provided in this procedure.)

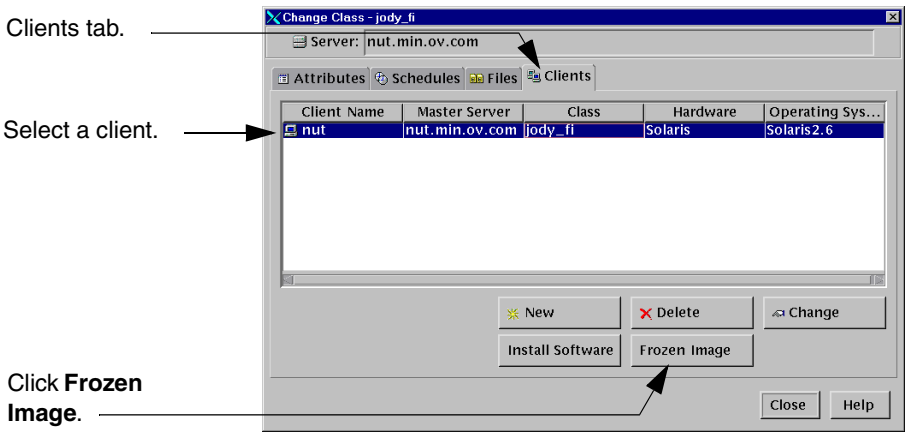
1. Start the NetBackup Administration interface by entering the following:

   ```
   /usr/openv/netbackup/bin/jnbSA &
   ```

2. Start the Backup Policy Management utility.

3. In the left pane, double click on the class. The Class dialog (Attributes tab) appears.

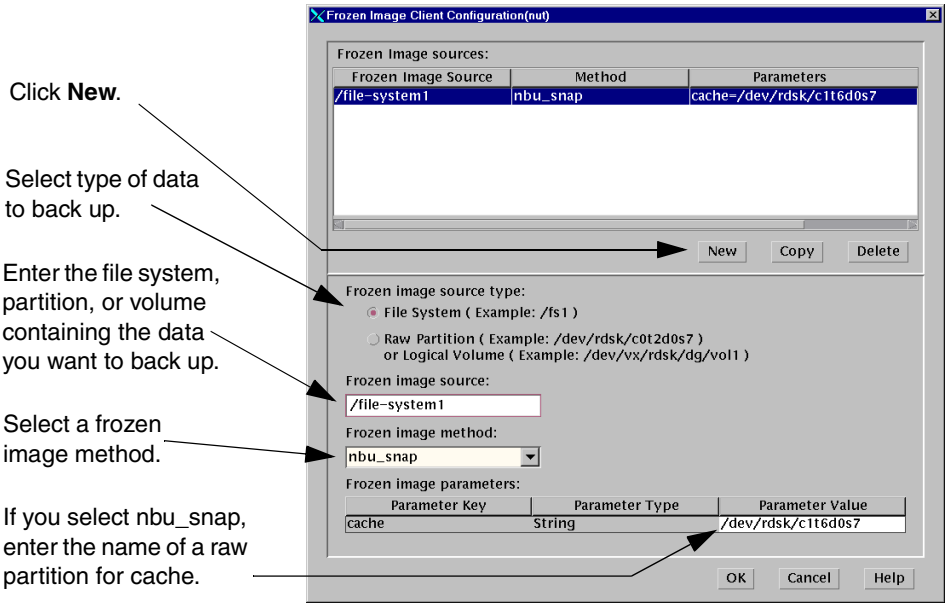
4. Click the Clients tab.



5. Select the client you want to configure for frozen image backup, then click Frozen Image.

Note The Frozen Image button is greyed out if the Allow frozen image clients checkbox is not checked on the Attributes tab.

The Frozen Image Client Configuration dialog appears.



NOTE! The settings on this dialog apply to a *client*, not to a class. These settings will apply to this client in every class that includes this client. Frozen image settings cannot be configured for a particular class.

6. Click New. A blank entry appears at the bottom of the Frozen Image Source list.

7. Select the Frozen image source type (file system, or raw partition or logical volume).

8. In the Frozen image source field, enter the name of a file system, raw partition, or Volume Manager volume. For example, enter:

   `/file-system1` (for a file system)

   `/dev/rdsk/c0t2d0s7` (for a raw partition)

   PLEASE NOTE!

   - If you want to specify the root directory (/) as the frozen image source, see page 54 regarding the cross mount points class attribute.
   - To back up individual files, specify the frozen image source as the *file system* that contains the files. Do not specify an individual file! (The files for backup must be specified in the class file list, as full path names.)

For example: If the class file list (see the Files tab on the Class dialog) contains `/usr/file1` and `/usr/file2`, specify the mounted file system `/usr` as the frozen image source. If the file list also contains `/var/config`, you must repeat this procedure starting at step 6 to create another frozen image source that designates the mounted file system `/var`. If the file list also contains a raw disk partition (such as `/dev/rdsk/c0t1d0s1`), repeat the procedure again to create a third frozen image source called `/dev/rdsk/c0t1d0s1`. See Example 1.

EXAMPLE 1:

Class name: Jungle

Client included in this class: **Tiger**

Tiger contains these mounted file systems and raw partition:
- /usr
- /var
- /dev/rdsk/c0t1d0s1

File list for class Jungle

Contains:
- /usr/file1
- /usr/file2
- /var/config
- /dev/rdsk/c0t1d0s1

Specify these frozen image sources:
- /usr
- /var
- /dev/rdsk/c0t1d0s1

See "Frozen Image Source" on page 53 for notes on frozen images. Example 2 at the end of this procedure shows a multiple-client configuration.

9. Select a frozen image method.

Note You cannot apply more than one method to the same frozen image source.

nbu_snap

The nbu_snap frozen image method is for making copy-on-write snapshot frozen images (for ufs or VxFS file systems).

fsclone

The fsclone frozen image method is for making copy-on-write snapshot frozen images with VERITAS File System clones, requiring Database Edition for Oracle (VxFS 3.4 file systems only). fsclone is not supported for backing up raw partitions.

vxvm

The vxvm frozen image method is for making mirror frozen images with VERITAS Volume Manager 3.1 snapshot mirrors.

The vxvm frozen image method works for any file system mounted on a VxVM volume. The frozen image source must be configured with a VxVM 3.1 snapshot mirror (otherwise, the backup will fail). For help configuring a snapshot mirror, refer to "Creating a Snapshot Mirror of the vxvm Frozen Image Source" on page 55.

10. If you chose nbu_snap as the frozen image method, specify a raw partition for the snapshot cache by entering the partition's full path name in the Parameter Value field.

For example: `/dev/rdsk/c2t0d3s3`

Caution The contents of the partition will be overwritten by the nbu_snap snapshot process. See "Copy-on-Write Snapshot" on page 11 for a description of snapshot cache.

Do not specify wildcards (such as `/dev/rdsk/c2*`).

11. To configure another frozen image source for the client, repeat step 6 through step 10.

12. When finished configuring frozen image sources, click OK.

13. To configure a frozen image for another client, select (or add) the client on the Clients tab of the Change Class dialog and repeat step 5 through step 12.

14. If you selected an offhost backup method (Third-Party Copy Device or NetBackup Media Server) in the previous procedure, you must create special configuration files. See "Creating Configuration Files for Offhost Backup" on page 58.

EXAMPLE 2: Frozen Image Configuration (*multiple clients in one class*)

Class name: Jungle

Clients included in this class:

Tiger and **Lily**

Tiger contains these mounted file systems and raw partition:
/dir1
/dir2
/dev/rdsk/c0t0d0s1

Lily contains this mounted file system and Volume Manager volume:
/lily1
/dev/vx/rdsk/volgrp1/vol1

File list for class Jungle[1]

/dir1
/dir2/file7
/dev/rdsk/c0t0d0s1
/lily1/file1
/dev/vx/rdsk/volgrp1/vol1

Define these frozen image sources for *Tiger*:

/dir1
/dir2
/dev/rdsk/c0t0d0s1

Define these frozen image sources for *Lily*:

/lily1
/dev/vx/rdsk/volgrp1/vol1

[1]Since the file list contains items that are not found on both clients, NetBackup will return status code 1, "the requested operation was partially successful." This is normal NetBackup reporting, not specific to the 4.0V release.

Notes on Offhost Backup and Frozen Images

Offhost Backup

For offhost backups (NetBackup Media Server or Third-Party Copy Device), the client's data must be on a disk that meets the following criteria:

- The disk must be either a SCSI or Fibre Channel device.
- The disk must be visible to both the NetBackup client and to the NetBackup media server. The disk must be connected through a SAN.
- The disk must be able to return its SCSI serial number in response to a serial-number inquiry (serialization).

Also note: The class file list must not contain the ALL_LOCAL_DRIVES entry if you are using offhost backup.

When Using the Third-Party Copy Device Backup Method

- NetBackup ServerFree Agent does not allow use of multiple data streams.
- The backup is incompatible with multiplexing (the writing of two or more concurrent backup jobs to the same storage device). To prevent multiplexing on a third-party copy backup, you must set Maximum multiplexing per drive to 1, in the Storage Unit Management utility.

Frozen Image Source

- To back up individual files, specify the frozen image source as the mounted file system that contains the files. The individual file(s) must be specified in the NetBackup file list for the class. When the backup occurs, only the files in the file list are backed up, not the entire file system.
- In the file list, be sure to specify absolute path names. Refer to the *NetBackup DataCenter System Administrator's Guide - UNIX* for help specifying files in a file list.
- If the file list includes files that do NOT reside within a frozen image source, and the Allow frozen image clients attribute is selected, the backup will fail.
- Do not change a frozen image definition unless you want that change to apply to all classes in which the client is included. For example, if you have already configured frozen image source `/fs1` (on client `Jody`) in class `Jody-1`, any change you make to that frozen image source definition for `/fs1` when configuring class `Bill-1` will also apply to frozen image source `/fs1` in class `Jody-1`.

- The Cross mount points class attribute is not available for classes that are configured for frozen images. This means that NetBackup will not cross file system boundaries during a backup of a frozen image. A backup of a high-level file system, such as / (root), will *not* back up files residing in lower-level file systems unless those file systems are also specified as separate entries in the file list. To back up `/usr` and `/var`, for instance, both `/usr` and `/var` must be included as separate entries in the file list.

  For more information on Cross mount points, refer to the *NetBackup DataCenter System Administrator's Guide - UNIX*.

Frozen Image Method

nbu_snap

The nbu_snap frozen image method is for making copy-on-write snapshot frozen images (for ufs or VERITAS VxFS file systems).

fsclone

The fsclone frozen image method is for making copy-on-write snapshot frozen images. VERITAS Database Edition for Oracle 2.2, with VERITAS File System (VxFS) 3.4, must be installed on NetBackup clients. VERITAS recommends that the fsclone frozen image method only be used with Oracle databases.

- The fsclone frozen image method is not supported for backing up raw partitions (whether FlashBackup or Standard classes).
- Make sure there is enough disk space available for the clone. The file system containing the frozen image source must have at least 5% free space in order to successfully implement the clone.

vxvm

The vxvm frozen image method is for making mirror frozen images with VERITAS Volume Manager 3.1 snapshot mirrors.

The vxvm frozen image method works for any file system mounted on a VxVM volume. However, before the backup is performed, the frozen image source must be configured with a VxVM 3.1 snapshot mirror (otherwise, the backup will fail). For help configuring a snapshot mirror, refer to "Creating a Snapshot Mirror of the vxvm Frozen Image Source" on page 55, or to the *VERITAS Volume Manager 3.1 Administrator's Reference Guide*.

Note Since VxVM 3.1 does not support fast mirror resynchronization on RAID-5 volumes, the vxvm frozen image method must not be used with VxVM volumes configured as RAID-5. If the vxvm frozen image method is selected for a RAID-5 volume, the backup will fail.

Creating a Snapshot Mirror of the vxvm Frozen Image Source

To use the vxvm frozen image method, you must create a snapshot mirror of the frozen image source before making a backup. Before specifying a frozen image source as described in this chapter, create a snapshot mirror on the client by using one of the following methods:

- In the Volume Manager Storage Administrator interface, select the volume that will be the frozen image source, right click on it, and select Snapshot from the pop-up menu. In the Volume Snapshot dialog, select Enable FMR (if available, see note below) and click the Snapstart button. For details, refer to the *Volume Manager Storage Administrator Administrator's Guide - Solaris*.

Or:

- Enter the following commands:

  `/usr/sbin/vxassist -g` *`disk_group`* `snapstart` *`volume_name`*
  `/usr/sbin/vxvol -g` *`disk_group`* `set fmr=on` *`volume_name`*

  where:

  - *disk_group* is the Volume Manager disk group to which the volume (frozen image source) belongs.
  - *volume_name* is the name of the volume designated at the end of the frozen image source path (for example, `vol1` in `/dev/vx/rdsk/dg/vol1`).
  - `fmr=on` sets the Fast Mirror Resynchronization attribute, which resynchronizes the mirror with its primary volume but only copies the blocks that have changed, rather than performing a full resynchronization. Fast mirror resynchronization can dramatically reduce the time required to complete the backup.

Note Fast Mirror Resynchronization (FMR) is a separately available product for VERITAS Volume Manager.

Designating a frozen image source is described under "Configuring a Frozen Image Method" earlier in this chapter.

Cache for nbu_snap (Parameter Value field)

- The cache specifies a raw disk partition: either a logical volume or physical device. This is used for storing the portions of the frozen image source that are changed by incoming write requests while the snapshot is in progress.
- Do not specify an active partition containing valuable data. Any data in that partition will be lost when the nbu_snap snapshot process is complete.
- Enter the full path name of the raw partition. Do not specify wildcards (such as `/dev/rdsk/c2*`) as paths.

Note Be sure to specify the actual character special device file. nbu_snap will not work for *block* special device files.

The basic requirements for the cache partition are:

- Must reside on the same host as the frozen image source that you have specified.
- Must be unmounted.
- Must have enough space to hold all the writes to the partition that may occur during the backup. Note that backups during nonworking hours normally require a smaller cache than a backup during peak activity.

Backup Policy Configuration Wizard

The Backup Policy Configuration Wizard helps you set up a basic NetBackup class (policy). If you used this wizard to configure a class for NetBackup 4.0V, please note the following:

- If you chose Back up all local drives, the wizard placed an entry called ALL_LOCAL_DRIVES in the class file list. NetBackup 4.0V does not support the ALL_LOCAL_DRIVES option for offhost backup (either NetBackup Media Server or Third-Party Copy Device). For offhost backups, be sure to remove the ALL_LOCAL_DRIVES entry from the class file list (use the Files tab on the Change Class dialog).
- The wizard automatically sets your storage device to Any_available. This is okay for local backups. To use an offhost backup method (Third-Party Copy Device or NetBackup Media Server), you must select a particular storage unit—do not select Any_available.

FlashBackup Classes

TechNote 232802 When applying a ServerFree Agent frozen image method to a client in a FlashBackup class, note the following:

- The nbu_snap and vxvm frozen image methods are valid for clients in a FlashBackup class. The fsclone frozen image method, however, is not valid for clients in a FlashBackup class. Although the Frozen Image Client Configuration dialog allows you to select fsclone for such clients, the backup will fail.
- For a FlashBackup class containing a client configured with a frozen image method as described earlier in this chapter, the file list should specify the files(s) but not the cache partition (do not include the `CACHE=` entry). The cache partition is specified in the Frozen Image Client Configuration dialog, explained under “Configuring a Frozen Image Method”in this chapter.

However, for a FlashBackup class that does not contain any clients configured with a frozen image method, the file list must specify the files(s) AND a cache partition (the CACHE= entry). Refer to "File List and Cache" in Chapter 3 of the *NetBackup 3.4 FlashBackup System Administrator's Guide*.

Multiple Data Streams

In NetBackup 4.0V, if the Allow multiple data streams class attribute is selected, all streams must be set to Active for the backup to be successful. This means that all streams must be able to start at the same time (no backups can be queued waiting for others to complete). For backups, make sure that the following are set to allow the number of active streams to be equal to or greater than the number of streams in the file list:

- Class attribute: Limit jobs per class
- Schedule setting: Media multiplexing
- Storage unit setting: Maximum multiplexing per drive
- System configuration setting: Maximum jobs per client

Note The Allow multiple data streams attribute is not supported with the Third-Party Copy Device offhost backup method.

Multiplexing

A backup using the Third-Party Copy Device offhost backup method is incompatible with multiplexing (the writing of two or more concurrent backup jobs to the same storage device). To prevent multiplexing on a third-party copy backup, set Maximum multiplexing per drive to 1 (in the Storage Unit Management utility, on the Change Storage Unit, Storage Unit Type Properties dialog).

Raw Partition Offhost Backups

When entering a raw partition in the file list for an offhost backup, do not specify a *block device* as the raw partition. NetBackup 4.0V does not support offhost backups of block devices. Instead, specify the raw partition as a *character device*.

Creating Configuration Files for Offhost Backup

Setting up offhost backup (Third-Party Copy Device or NetBackup Media Server) for a NetBackup class is a two-stage process:

- Use the NetBackup Administration interface to select an offhost backup method and frozen image method (described in previous sections).
- Create configuration files, described below.

Note These files are needed only for the Third-Party Copy Device or NetBackup Media Server backup methods. If you are not using either of these backup methods, you do not need to create these files. You may skip this section.

1. Create a `3pc.conf` file by entering the following on the NetBackup media server when no backups are in progress:

   ```
   cd /usr/openv/netbackup/bin/admincmd/
   ./bptpcinfo -a >/usr/openv/netbackup/3pc.conf
   ```

   This creates a `3pc.conf` file containing a list of all source and destination devices on the SAN that NetBackup ServerFree Agent can use. For example:

Figure 10. 3pc.conf file.

```
# devid  major  minor  devpath          sn    npid  lun       wwn
# %d     %d     %d     %s               %s    %x    %d        %s
  0      32     130    /dev/rdsk/c2t0d0s2        SEAGATE:ST39173N:LM98269700007914H8K6  0x0  0  WWN
  1      32     170    /dev/rdsk/c2t5d0s2        SEAGATE:ST39173N:LM9803140000191307A9  0x0  0  WWN
  2      32     178    /dev/rdsk/c2t6d0s2        IBM:DNES-318350W:AK0MM225              0x0  0  WWN
  3      33     349    /dev/rmt/2cbn             SONY:TSL-A500C:0009480002              0x0  0  WWN
```

Note For the NetBackup Media Server offhost backup method, no more configuration is needed. You can skip the rest of this section.

2. **For the Third-Party Copy Device method only:** edit the `3pc.conf` file as follows:

- For each storage device listed in the `3pc.conf` file, replace the string *WWN* with the actual world-wide name of the third-party copy device, bridge (or other SAN device) to which the storage device is connected. For some SAN devices, the world-wide name is automatically provided in this file.

Note The world-wide name (wwn) is a 16-digit number. On some devices, the WWN can be found on the back of the device or in the boot-time messages written to the `/var/adm/messages` log on the NetBackup Media Server. For the Chaparral router, the world-wide name can be displayed by the Chaparral FC-to-SCSI Router Administrator interface (see the example in Chapter 2 on page 34: `Port WWN = 2000005013B05497`).

Figure 11. 3pc.conf file—what to edit.

```
# devid  major  minor  devpath          sn   npid  lun        wwn
# %d     %d     %d     %s               %s   %x    %d         %s
  0      32     130    /dev/rdsk/c2t0d0s2        SEAGATE:ST39173N:LM98269700007914H8K6  0x0  0  WWN
  1      32     170    /dev/rdsk/c2t5d0s2        SEAGATE:ST39173N:LM98031400001913O7A9  0x0  0  WWN
  2      32     178    /dev/rdsk/c2t6d0s2        IBM:DNES-318350W:AK0MM225              0x0  0  WWN
  3      33     349    /dev/rmt/2cbn             SONY:TSL-A500C:0009480002              0x0  0  WWN
```

Replace each instance of “WWN” with the actual world-wide name (16-digit value) of the third-party copy device, bridge, or other SAN device that the storage device is connected to.

If you are using the NetBackup Media Server backup method, there is no need to specify world-wide names. Just make sure the `3pc.conf` file has been created on the NetBackup media server (see step 1).

Figure 12 contains an example message showing a world-wide name for a device, written to the `/var/adm/messages` log on the server. Note there are two versions of the world-wide name: the *node* wwn and *port* wwn. For entry in the `3pc.conf` file, try the port wwn first.

Figure 12. Example of world-wide name in /var/adm/messages log/

```
Dec 12 16:07:19 sunflower unix: fca-pci0: Target 1: Port 0000e8 (1000005013b10619:2000005013b10619) online.
```

This is the “Node WWN”

This is the “Port WWN”

When editing the 3pc.conf file, use the Port WWN. If that fails, try the Node WWN.

NOTE!

The format of this message may vary depending on the host bus adapter card that is used.

In the `3pc.conf` file, each device has an entry containing the following:

devid major minor devpath sn npid lun wwn

These entries are described below. For each storage device in the `3pc.conf` file, the only value that you have to enter, however, is the world-wide name of the third-party copy device, bridge (or other SAN device) to which the storage device is connected.

devid

A NetBackup-internal identifier for a particular device.

major

Each device driver has a major number.

minor

Each device has a minor number.

devpath

The path to the Fibre Channel device. This entry must be specific to the media server on which the `3pc.conf` file resides.

sn

The serial number of the device, of the form:

Vendor ID:Product ID:device serial number

Note Disk devices used for offhost backup must support SCSI serial-number inquiries. This means that disk device entries in the `3pc.conf` file must include serial numbers.

npid

The fibre channel *n-port ID*, which identifies this device on the SAN.

lun

The device's logical unit number. In combination with the world-wide name, the *lun* allows NetBackup to identify the devices that are attached by SCSI connection to the third-party copy device, bridge, or other SAN device.

wwn

The device's fibre channel *world-wide name*, which identifies the device on the SAN. This is a 16-digit identifier, consisting of an 8-digit manufacturer name, and an 8-digit device name (numeric). See the example in Figure 12.

3. For the Third-Party Copy Device method only:

a. On the NetBackup media server, create the following file:

- If your SAN has only one third-party copy device†:

  `/usr/openv/netbackup/mover.conf`

- If your SAN has more than one third-party copy device:

  `/usr/openv/netbackup/mover.conf.`*`storage_unit_name`*

where *storage_unit_name* is the name of a storage unit. When the following steps are complete, this will allow a particular third-party copy device to use a particular storage device by means of a storage unit name. Here is an example `mover.conf` file name of the *storage_unit_name* type:

`mover.conf.nut-4mm-robot-tl4-0`

where `nut-4mm-robot-tl4-0` was selected as the storage unit in the Change Class dialog (see example dialog on page 47).

Note If there is more than one third-party copy device, the *storage_unit_name* in this file name MUST EXACTLY MATCH the name of the storage unit as it appears in the Class storage unit field of the Backup Policy Management Change Class dialog.

Also note: For sites with more than one third-party copy device, there is another option for creating a `mover.conf` file:

`/usr/openv/netbackup/mover.conf.`*`class_name`*

where *class_name* is the name of a NetBackup class. All backups for this class will use the third-party copy device specified in this `mover.conf.`*`class_name`* file. Note that NetBackup looks for an appropriate `mover` file in the following order:

- `mover.conf.`*`class_name`*
- `mover.conf.`*`storage_unit_name`*
- `mover.conf`

†. For the `mover` file, the *third-party copy device* refers to the backup agent, which may or may not be the device to which the storage units are connected. The backup agent (third-party copy device) directs the backup data movement on behalf of the NetBackup client.

b. In the `mover` file (for any of the three `mover` file-name types), enter the SCSI pass-through driver (SG driver) device path of the device that will act as the third-party copy device.

Note Only one third-party copy device path can be specified per `mover` file (this applies to any of the three `mover` file-name types).

Here is an example path for a third-party copy device:

```
/dev/sg/c6t1l0
```

You can use the following command to determine the SG driver device path:

```
sgscan basic
```

Here is some sample output (see notes following):

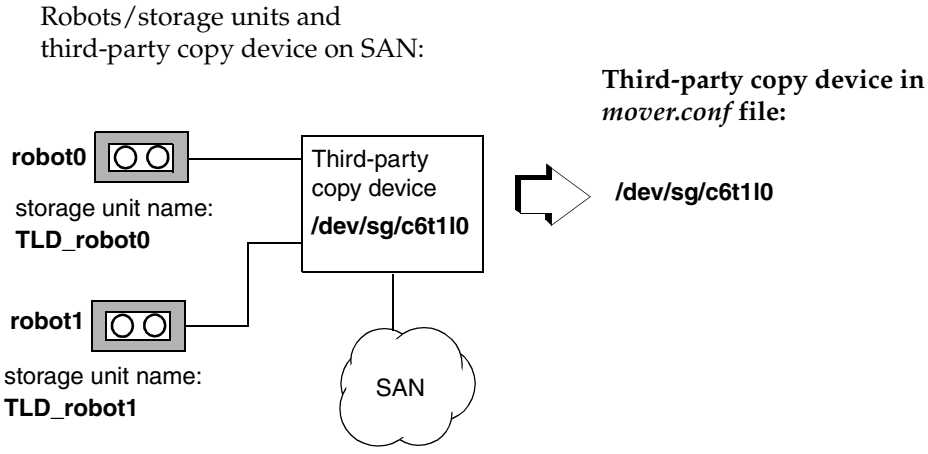
```
/dev/sg/c6t1l0: dev type ch PATHLGHTSAN Gateway     0016
/dev/sg/c6t1l1: dev type 0h SEAGATE ST39173N        6244
/dev/sg/c6t1l2: dev type 0h FUJITSU MAG3182L SUN18G 1111
/dev/sg/c6t1l3: removable dev type 1h Quantum DLT4000    D57C
/dev/sg/c6t1l4: removable dev type 1h Quantum DLT4000     D57C
/dev/sg/c6t1l5: removable dev type 8h HP      C5173-4000   3.04

/dev/sg/c6t4l0: dev type 3h CNSi    FS1310          jj01
/dev/sg/c6t4l1: dev type 0h FUJITSU MAG3182L SUN18G 1111
/dev/sg/c6t4l2: dev type 0h FUJITSU MAG3182L SUN18G 1111
/dev/sg/c6t4l3: dev type 0h FUJITSU MAG3182L SUN18G 1111
/dev/sg/c6t4l4: dev type 0h FUJITSU MAG3182L SUN18G 1111
/dev/sg/c6t4l5: dev type 0h FUJITSU MAG3182L SUN18G 1111
/dev/sg/c6t4l6: dev type 0h FUJITSU MAG3182L SUN18G 1111
```

Notes:

- "`dev type ch PATHLGHTSAN Gateway`" indicates a Pathlight SAN Gateway device. Its device path, in this example, is `/dev/sg/c6t1l0`.
- "`dev type 3h CNSi`" indicates a Chaparral device. Its device path, in this example, is `/dev/sg/c6t4l0`.

Figure 13 shows an example `mover.conf` file for a site with one third-party copy device.

Figure 13. Example mover.conf file (no file-name extension, for one third-party copy device)



In this example, all offhost backups will use third-party copy device /dev/sg/c6t1l0 specified in the *mover.conf* file. The backup uses the storage unit (TLD_robot0 or TLD_robot1) specified for the class on the Change Class dialog.

c. To configure another third-party copy device, repeat step a and step b, specifying a different class or storage unit on the file name and entering the SG driver device path of a third-party copy device.

See Figure 14 and the description following for an example configuration with two third-party copy devices.

Figure 14. Example mover.conf.*storage_unit_name* files (for two third-party copy devices)

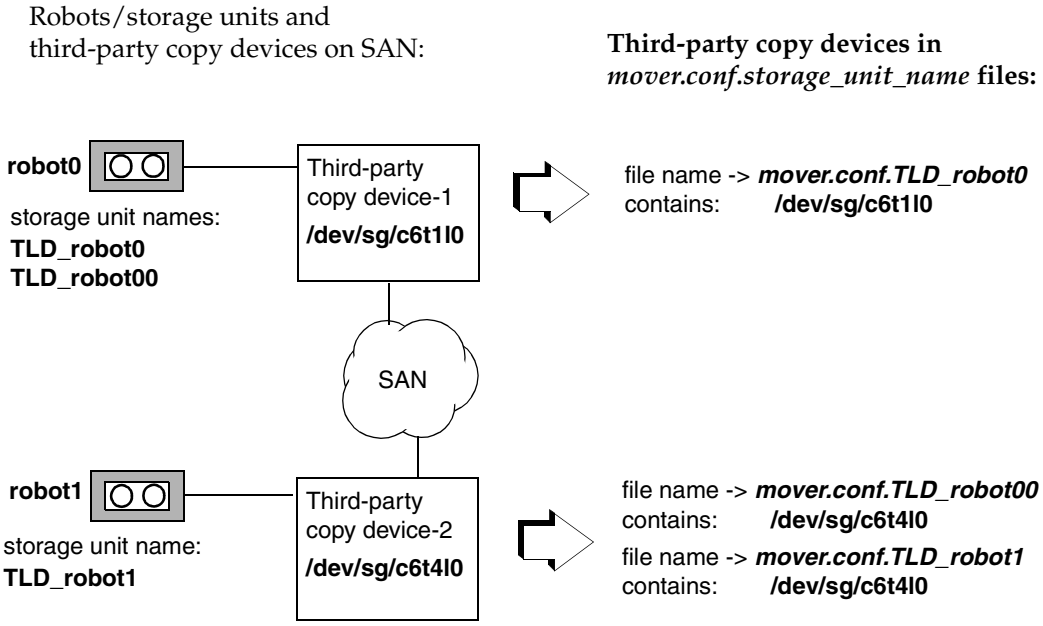


Figure 14 shows two robots (robot0 and robot1). Robot0 has been assigned two storage unit names, `TLD_robot0` and `TLD_robot00`. Robot1 has been assigned one storage unit name, `TLD_robot1`.

Figure 14 also shows two third-party copy devices, device-1 with a SCSI pass-through device path of `/dev/sg/c6t1l0`, and device-2 with a SCSI pass-through device path of `/dev/sg/c6t4l0`.

- To allow third-party copy device-1 to use robot0, create a file named *`mover.conf.TLD_robot0`*. In the file, include the device path of device-1 (`/dev/sg/c6t1l0`).
- To allow third-party copy device-2 to use the same robot (robot0), create a file named *`mover.conf.TLD_robot00`*. In the file, include the device path of device-2 (`/dev/sg/c6t4l0`). Notice that the file name must refer to a different storage unit, *`TLD_robot00`*, which is assigned to robot0.
- To allow third-party copy device-2 to use robot1, create a file named *`mover.conf.TLD_robot1`* that includes the device path of device-2 (`/dev/sg/c6t4l0`).

Note The *storage_unit_name* portion of the `mover.conf.`*storage_unit_name* file name must exactly match the actual name of the storage unit. See page 47 for an example Change Class dialog showing a storage unit name in the Class storage unit field.

NetBackup 4.0V ServerFree Agent System Administrator's Guide for Solaris

Using NetBackup 5

The following topics are covered in this chapter:

- Performing a Backup
- Performing a Restore

Performing a Backup

Automatic Backup

The most convenient way to back up client data is to configure a Standard, FlashBackup, or Oracle class and then set up schedules for automatic, unattended backups. To use NetBackup 4.0V ServerFree Agent, you must configure a frozen image method and (optional) offhost backup method as described in Chapter 4, "NetBackup Configuration." To add new schedules or change existing schedules for automatic backups, follow the guidelines in the *NetBackup DataCenter System Administrator's Guide - UNIX*.

Manual Backup

The administrator can use the NetBackup Administration interface on the master server to execute a backup for a Standard, FlashBackup, or Oracle class. To use NetBackup 4.0V ServerFree Agent, you must configure a frozen image method and (optional) offhost backup method as described in Chapter 4, "NetBackup Configuration."

See the *NetBackup DataCenter System Administrator's Guide - UNIX* for instructions on making manual backups.

User-Directed Backup and Archive

From a NetBackup 4.0V client, the user can execute a backup for a Standard, FlashBackup, or Oracle class. The NetBackup administrator must configure a frozen image method and (optional) offhost backup method as described in Chapter 4, "NetBackup Configuration."

See the *NetBackup 4.0V User's Guide* for instructions on making user-directed backups and archives.

Performing a Restore

FlashBackup Class

You can use the NetBackup Administration interface on the client to restore individual files or directories (or a raw partition) in a FlashBackup class. See Chapter 4 of the *NetBackup FlashBackup 3.4 System Administrator's Guide* for instructions.

Standard or Oracle Class

You can use the NetBackup Administration interface on the client to restore a file system, raw partition, or volume in a Standard or Oracle class. See the *NetBackup 4.0V User's Guide* for instructions.

NetBackup 4.0V ServerFree Agent System Administrator's Guide for Solaris

Troubleshooting 6

This chapter covers the following topics.

- Gathering Information and Checking Logs
- Important Notes - Please Read
- NetBackup ServerFree Agent Problems
- VfMS Error Conditions

Gathering Information and Checking Logs

You can resolve many problems on your own by setting up the appropriate logs, reproducing the problem, and then checking the logs. For an in-depth description of NetBackup logs, refer to Chapter 3 of the *NetBackup Troubleshooting Guide - UNIX*.

- To create more log information, put VERBOSE in the `bp.conf` file on the NetBackup master and client.

Note The directories under `/usr/openv/netbackup/logs` can eventually require a lot of disk space, so delete them when you are finished troubleshooting.

- Backup Messages

During a backup, NetBackup ServerFree Agent messages are written to the following log directories: `online_util`, `bpbkar`, and `bptm`. If necessary, create these directories, using an access mode of 777 so NetBackup can write to the logs.

`/usr/openv/netbackup/logs/online_util` (on the NetBackup client)

`/usr/openv/netbackup/logs/bpbkar` (on the NetBackup client)

`/usr/openv/netbackup/logs/bptm` (on the NetBackup media server)

- Restore Messages

During a restore, NetBackup ServerFree Agent messages are logged to the following activity log on the master server: `/usr/openv/netbackup/logs/bprestore`. If necessary, create this directory (use an access mode of 777).

- snapctl Driver Messages

Messages from the `snapctl` driver are logged in the client's `/var/adm/messages` file along with other kernel messages.

Before Contacting VERITAS Customer Support

Before calling customer support, please gather as much log information as possible. Be sure to have the following information ready:

- NetBackup version
- Operating system version of the NetBackup ServerFree Agent client
- Note whether or not the action that failed had ever worked, and whether the problem is repeatable
- Log information

Important Notes - Please Read

- The disk containing the client's data (the files to back up) must be a SCSI or Fibre Channel device if you are using offhost backup (NetBackup Media Server or Third-Party Copy Device).
- The disk containing the client's data must be visible to both the NetBackup client and the NetBackup media server if you are using offhost backup. The disk can be connected through a SAN.
- For offhost backup, a disk device must be able to return its SCSI serial number in response to a serial-number inquiry (serialization).
- When configuring offhost backup (Third-Party Copy Device or NetBackup Media Server), a particular storage unit must be specified for the class—do not choose Any_available. For offhost backup configuration instructions, refer to "Configuring a Backup Method" in Chapter 4.
- The *storage_unit_name* portion of a `mover.conf.`*storage_unit_name* file name must exactly match the actual storage unit name (such as `nut-4mm-robot-tl4-0`) that you have defined for the class. See "Creating Configuration Files for Offhost Backup" starting on page 58 for help creating a `mover.conf.`*storage_unit_name* file.

  Similarly, the *class_name* portion of a `mover.conf.`*class_name* file name must match the actual name of the class that the third-party copy device is to be associated with.

NetBackup ServerFree Agent Problems

Problem During Installation

If you receive the following message during installation:

```
/usr/openv/netbackup/bin/version not found.
Add-On Product Installation Aborted.
```

you have tried to install the ServerFree Agent add-on software before installing the base NetBackup 4.0V software.

Status Codes

The following status (exit) codes are listed in numerical order.

Status code 9: an extension package is needed but was not installed

- NetBackup ServerFree Agent software was not installed on the client. Refer to "Distributing ServerFree Agent Software to Clients" in Chapter 3 for installation instructions.

Status code 11: system call failed

Possible causes:

- The file system specified as a frozen image source is not mounted. In this case, you may see the following in the `/usr/openv/netbackup/logs/bpbkar` log:

  ```
  bpbkar: FTL - frozen image processing failed, status 11
  bpbkar: ERR - bpbkar FATAL exit status = 11: system call failed
  bpbkar: INF - EXIT STATUS 11: system call failed
  ```

  and the following in the `/usr/openv/netbackup/logs/online_util` log:

  ```
  onlfi_vfms_logf: INF - cannot snap_on, err: 5
  delete_mount_point: INF - Deleted mount point
  /tmp/__jody_test:20958
  onlfi_freeze: FTL - VfMS error 11 (Fatal method error):
  vfm_freeze: method: nbu_snap, type: FIM, function: nbu_snap_freeze
  onlfi_freeze: FTL - VfMS method error details: error 5: cannot
  snap_on, err: 5
  onlfi_thaw: WRN - / is not frozen
  ```

  Make sure that the file system specified for the frozen image source has been mounted.

- vxvm is selected as the frozen image method type but the frozen image source is not configured over a VERITAS Volume Manager VxVM volume. In this case, you may see the following in the `/usr/openv/netbackup/logs/bpbkar` log:

  ```
  bpbkar main: FTL - frozen image processing failed, status 11
  bpbkar Exit: ERR - bpbkar FATAL exit status = 11: system call
  failed
  bpbkar Exit: INF - EXIT STATUS 11: system call failed
  ```

  and something like the following in the `/usr/openv/netbackup/logs/online_util` log:

  ```
  onlfi_vfms_logf: INF - vxvm_freeze.1036: Frozen image source
  /cockpit1 on device /dev/dsk/c1t0d0s6 is not on a VxVM volume
  delete_mount_point: INF - Deleted mount point
  /tmp/_cockpit1_coc_group1:3518
  onlfi_freeze: FTL - VfMS error 11 (Fatal method error): vfm_freeze:
  method: vxvm, type: FIM, function: vxvm_freeze
  onlfi_freeze: FTL - VfMS method error details: error 9:
  vxvm_freeze.1036: Frozen image source /cockpit1 on device
  /dev/dsk/c1t0d0s6 is not on a VxVM volume
  onlfi_thaw: INF - fim=vxvm
  onlfi_thaw: WRN - /cockpit1 is not frozen
  ```

  Make sure that the frozen image source is configured over a VERITAS Volume Manager VxVM volume.

- vxvm was selected as the frozen image method type, but a VERITAS Volume Manager snapshot mirror of the frozen image source volume had not been created prior to running the backup, or had not been resynchronized after a previous backup. In either case, you may see the following in the `/usr/openv/netbackup/logs/online_util` log:

  ```
  17:12:51 FTL - VfMS error 11 (Fatal method error): vfm_freeze:
  method: vxvm, type: FIM, function: vxvm_freeze
  17:12:51 FTL - VfMS method error details: error 3: do_cmd.718:
  Command failed with status=11:
  vxprint -g rootdg -q -t -e 'assoc="simple" && pl_state="SNAPDONE"'
  </dev/null >/var/tmp/VfMSAAAs7a4Uw 2>/var/tmp/VfMSBAAt7a4Uw
  ```

  As described under "Creating a Snapshot Mirror of the vxvm Frozen Image Source" on page 55, create a snapshot mirror on the client before running the backup.

- When using `nbu_snap` as a frozen image method, you may have stale snapshots if status code 11 occurs with the following messages in the `online_util` log. (Stale snapshots are those that were not automatically deleted by `nbu_snap`.)

  ```
  onlfi_freeze: WRN - VfMS error 11: vfm_freeze: fl_freeze error
  onlfi_freeze: WRN - VfMS method error 5: cannot snap_on, afs =
  /oracle/ufs_r, cache /dev/rdsk/c4t1d11s4, err: 11
  ```

a. Look for stale snapshots by running the `/usr/openv/netbackup/bin/driver/snaplist` command when there are no active backups running. If the `snaplist` command shows cache entries, there are stale snapshots. Nothing is displayed if there are no stale snapshots.

Example `snaplist` output:

```
id  ident        size     cached   minblk     err time
43  6515     8390970    0          0          0   11/16/00 13:31:36
   device = /dev/rdsk/c1t6d0s0
   cache  = /dev/rdsk/c1t6d0s7
```

b. Use the `snapoff` command to remove the stale snapshot, as follows:

`/usr/openv/netbackup/bin/driver/snapoff` *`id`*

where *id* is the id from the `snaplist` output (such as 43 in the above example).

Status code 12: file open failed

This message may appear in the `/usr/openv/netbackup/logs/bptm` log, accompanied by the following:

```
shb_init: tpc_read_config failed: cannot open file
/usr/openv/netbackup/3pc.conf
```

This may indicate that the class is configured with either NetBackup Media Server or Third-Party Copy Device as the offhost backup method, but that the `3pc.conf` file does not exist. For instructions on creating the `3pc.conf` file, refer to "Creating Configuration Files for Offhost Backup" in Chapter 4.

Status code 13: file read failed

This code may appear in the `/usr/openv/netbackup/logs/bpbkar` log, and can indicate the following:

- The files to back up reside on an IDE drive as opposed to SCSI, and the offhost backup method was set to either NetBackup Media Server or Third-Party Copy Device. If you are using offhost backup, the disk containing the client files must be a SCSI or Fibre Channel device.

  If the disk is an IDE drive, you may see the following in the `/usr/openv/netbackup/logs/online_util` log:

  ```
  get_disk_info: FTL - /var/tmp/caa026fEU disk_inquiry failed.
  Errno = 25: Inappropriate ioctl for device
  ```

  and the following may appear in the `/usr/openv/netbackup/logs/bpbkar` log:

  ```
  bpbkar: INF - Processing /var
  ```

```
bpbkar: ERR - get_disk_info() failed, status 13
bpbkar: ERR - tpc_get_disk_info() failed: err 13
bpbkar: ERR - bpbkar FATAL exit status = 13: file read failed
bpbkar: INF - EXIT STATUS 13: file read failed
```

- The files to back up exist on a file system that is not mounted. The file system specified as the frozen image source must be mounted. If the frozen image source is not mounted but the mount point is present, NetBackup may try to take a frozen image of the directory above the directory that was specified as the frozen image source.

Status code 20: invalid command parameter

If the following appears in the `/usr/openv/netbackup/logs/bptm` log,

```
bptm: cannot perform Third-Party-Copy for multiplexed backups
send_brm_msg: ERROR 20
bptm: EXITING with status 20
```

multiplexing was enabled on a third-party copy backup. The Third-Party Copy Device offhost backup method is incompatible with multiplexing (the writing of two or more concurrent backup jobs to the same storage device). You must disable multiplexing for any third-party copy backups. If multiplexing is enabled, the backup will fail. See “Multiplexing” on page 57.

Status code 41: network connection timed out

If you backed up a sparse file that included thousands of holes, a restore of that file may fail because the connection timed out. To avoid a timeout and to successfully restore the file, set or add the CLIENT_CONNECT_TIMEOUT option in the `/usr/openv/netbackup/bp.conf` file to a larger value (the default is 300 seconds). The CLIENT_CONNECT_ TIMEOUT option is described in the *NetBackup DataCenter System Administrator's Guide - UNIX*.

Status code 69: invalid file list specification

If this was an offhost backup (NetBackup Media Server or Third-Party Copy Device), code 69 may indicate that the file list contains the ALL_LOCAL_DRIVES entry. NetBackup 4.0V does not support the ALL_LOCAL_DRIVES entry for offhost backup. Remove the ALL_LOCAL_DRIVES entry from the file list.

Status code 77: execution of the specified system command returned a nonzero status

Indicates any of several problems. Review the `online_util` log for further details. Below is one possibility:

- The class file list contains files that do not reside within a mounted file system that was designated as the frozen image source. For a frozen image method to be applied to the backup of individual files, the frozen image source must be a file system (not a raw partition or Volume Manager volume) and the files in the class file list must reside within that file system.

Status code 84: media write error

If the following message appears in the `/usr/openv/netbackup/bptm` log, and the values for `key`, `asc`, and `ascq` are all *zero* (`0x0`) as shown in this example message:

```
tape error occurred on extended copy command, key = 0x0, asc = 0x0,
ascq = 0x0
```

your host-bus adapter and its driver are probably not supported by NetBackup 4.0V. The host-bus adapters and drivers supported in this release are listed in Chapter 2 of the *NetBackup 4.0V Release Notes*.

Status code 154: storage unit characteristics mismatched to request

The class storage unit was set to Any_available and the offhost backup method was set to Third-Party Copy Device or NetBackup Media Server. Do not choose Any_available. A particular storage unit (such as `nut-4mm-robot-tl4-0`) must be specified (see example on page 47) when Third-Party Copy Device or NetBackup Media Server is specified as the offhost backup method.

Note The storage unit name (such as `nut-4mm-robot-tl4-0`) must exactly match the *storage_unit_name* portion of a `mover.conf`.*storage_unit_name* file, in `/usr/openv/netbackup/` on the NetBackup media server. See "Creating Configuration Files for Offhost Backup" starting on page 58 for help creating a `mover.conf`.*storage_unit_name* file.

Status code 170: third-party copy backup failure

Usually indicates a problem with the `3pc.conf` file or the `mover.conf` file. (These files are described under "Creating Configuration Files for Offhost Backup" in Chapter 4.) May also indicate a problem with the third-party copy device.

Possible causes of status code 170 are the following:

- A *non* third-party copy device is listed in `3pc.conf` file.

- An incorrect `lun` is specified in the `3pc.conf` file, or the device does not exist.
- An appropriate `mover.conf` file (with or without file-name extension) could not be found. In this case, the `/usr/openv/netbackup/logs/bptm` log may also show the following:

  ```
  09:51:04 [22281] <2> setup_mover_tpc: no mover.conf.vertex_std_tpc
  or mover.conf file exists, cannot perform TPC backup
  09:51:04 [22281] <16> bptm: unable to find or communicate with
  Third-Party-Copy mover for class vertex_std_tpc
  ```

  Make sure that an appropriate `mover.conf` file exists in `/usr/openv/netbackup` on the media server. This file can be any of the following:

  - `mover.conf.`*`class_name`* file, where *`class_name`* exactly matches the name of the class.
  - `mover.conf.`*`storage_unit_name`*, where *`storage_unit_name`* exactly matches the name of the storage unit selected in the Backup Policy Management Change Class attributes dialog.
  - `mover.conf` file (no extension) for configurations that have only one third-party copy device.

  Note that NetBackup looks for an appropriate `mover.conf` file in the above order.
- The SCSI pass-through path of the third-party copy device, as entered in the `mover.conf` file (with or without file-name extension), does not exist. In this case, the `/usr/openv/netbackup/logs/bptm` log may also show the following:

  ```
  09:50:12 [22159] <16> setup_mover_tpc: open of passthru path
  /dev/sg/cXtXlX failed, No such file or directory
  09:50:12 [22159] <16> bptm: unable to find or communicate with
  Third-Party-Copy mover for class vertex_std_tpc
  ```

  Correct the SCSI pass-through path of the third-party copy device that is entered in the `mover.conf` file.
- The third-party copy device returned an error.

  If you see either of the following messages in `/usr/openv/netbackup/logs/bptm` log:

  ```
  cannot process extended copy error due to truncated
  sense data, may be HBA problem

  disk error occurred on extended copy command, key = 0x0,
  asc = 0x0, ascq = 0x0
  ```
  (where `key`, `asc` and `ascq` are all *zero*)

  your host-bus adapter (HBA) and its driver may need to be updated, or may not be supported by NetBackup ServerFree Agent. The host-bus adapters and drivers supported in this release are listed in the *NetBackup 4.0V Release Notes*.

For the Chaparral router:

- In the `/usr/openv/netbackup/logs/bptm` log, the asc and ascq bytes (bytes 12 and 13, counting from byte 0) of the SCSI sense data contain error codes for the Chaparral router. If the asc/ascq bytes contain *non-zero* values (those other than 0x0), an error has occurred.
- In the `/usr/openv/netbackup/logs/bptm` log, byte 14 of the SCSI sense data contains extended copy error codes for the Chaparral router. If byte 14 contains a *non-zero* value (not 0x0), an error has occurred.

  Note: Contact Chaparral technical support for a description of the sense data codes. Figure 15 shows example SCSI sense data.

Figure 15. Example SCSI sense data

```
start_copy: starting execute_3pcopy(), number segments = 1, total blocks 256
process_copy_error: sense data =
        0x70 0x0 0xa 0x0 0x0 0x0 0x0 0x1d
        0x0 0x12 0x0 0x0 0x28 0x0 0x89 0x0
        0x0 0x0 0x2 0x70 0x0 0x6 0x0 0x0
        0x0 0x0 0xa 0x0 0x0 0x0 0x0 0x28
        0x0 0x0 0x0 0x0 0x0
```

For the Pathlight SAN Gateway

- In the `/usr/openv/netbackup/logs/bptm` log, the asc and ascq bytes (bytes 12 and 13) of the SCSI sense data contain error codes for the Pathlight SAN Gateway. If the asc/ascq bytes contain *non-zero* values (not 0x0), an error may have occurred (see Figure 15).

  Note: Contact Pathlight technical support for a description of the asc and ascq bytes of the sense data codes.

Status code 227: no entity was found

Indicates any of several problems, as follows:

- Check the `/usr/openv/netbackup/logs/online_util` log on the client for the following messages:

```
onlfi_get_fsmap_info: FTL - /usr/openv/netbackup/fi.conf open
failed. Errno = 2: No such file or directory

onlfi_process_fs_list_fs_entry: FTL - No frozen image mapping
information for /vol1
```

This indicates that the frozen image configuration file was not found. The frozen image configuration file is created with the Frozen Image Client Configuration dialog when you follow the configuration procedure described in Chapter 4.

- Check the `/usr/openv/netbackup/logs/online_util` log for the following message:

  ```
  onlfi_process_fs_list_fs_entry: FTL - No frozen image
  mapping information for /vol1
  ```

  If you find this message but no "`fi.conf open failed`" message, the `fi.conf.`*master server* file was created, but the frozen image source has not been specified in the file. To specify a frozen image source, see the instructions under "Configuring a Frozen Image Method" in Chapter 4.

VfMS Error Conditions

For VfMS errors in the `/usr/openv/netbackup/logs/online_util` log, refer to the following for an explanation of the error codes.

VfMS error codes:

0 - successful

1 - vfm_init() not called

2 - feature not supported

3 - bad file path

5 - file open failed

6 - invalid method handle

7 - file does not exist

8 - memory allocation failure

9 - miscellaneous OS error (see Errno=)

10 - non-fatal method error

11 - fatal method error

12 - error in dynamic library system call

13 - invalid argument

14 - one or more open file handles

15 - invalid file handle

16 - volume open failure

17 - frozen image does not exist

18 - invalid frozen image configuration parameter

19 - volume path not recognized

20 - invalid method name

VfMS method error:

FIM: nbu_snap

0 - no error

1 - memory allocation error

2 - error in parsing string

3 - system error

4 - cannot open snap driver

5 - cannot snap on

6 - cannot snap off

7 - invalid argument

FIM: vxvm

0 - no error

1 - memory allocation error

2 - error in parsing string

3 - system error

4 - error opening a file

7 - invalid argument

8 - no available mirror to use as a frozen image

9 - file system resides on non-VxVM volume

10 - internal data or logic error

FIM: fsclone

0 - no error

1 - memory allocation error

2 - invalid argument

3 - system error

FMM: dsk

1 - failed to open fs_open

2 - invalid argument

3 - memory allocation error

4 - system call error

5 - read error when partitioning table

FMM: nbu_snap

1 - invalid argument

2 - map ioctl error

3 - memory allocation error

4 - system call error

5 - cannot find snapshot devices

FMM: ufs

1 - failed to open fs_open

2 - failed on fset_get

3 - invalid argument

4 - memory allocation error

5 - system call error

6 - cannot get dnode information from special file

7 - file type does not match file system type

8 - map offset must be a multiple of 512

9 - file is too big

FMM: vxfs

1 - failed to open fs_open

2 - failed on fset_get

3 - invalid argument

4 - memory allocation error

5 - system call error

6 - cannot get dnode information from special file

7 - file type does not match

8 - map offset must be multiple of 512

10 - unable to open /etc/mnttab

FMM: vxvm

1 - memory allocation error

2 - cannot load volume database

3 - volume layout is not supported

4 - no volume for device

6 - volume not active

7 - no plex for the volume

8 - invalid argument

9 - system call error

10 - no vxvm notify received

11 - vxvm configuration call failed

12 - RAID5 in degraded mode

Solaris snapctl Driver A

Under normal conditions, the snap driver is invoked only by NetBackup. The snap driver is invoked if the nbu_snap frozen image method is configured for the frozen image source that is being backed up.

A cache partition must be specified for the cache parameter in the Frozen Image Client Configuration dialog (described in Chapter 4, “NetBackup Configuration”). The same cache can be used by any number of concurrent nbu_snap backups, as long as it is big enough.

The cache size should be approximately 10% to 15% of the total of all frozen image sources that are associated with the specific cache. This assumes no more than a moderate level of write activity during backups.

If a cache overflows, all snapshots that are using the cache will become unreadable and the backups that are reading the snapshots will fail.

Command Usage

snapoff

`snapoff` terminates a snapshot that was previously initiated by a backup that failed abnormally. `snapoff` must be invoked as:

`/usr/openv/netbackup/bin/driver/snapoff snap1 ... snap`*`n`*

If `snapoff` is successful, a message of the following form will be displayed:

```
snap 1 disabled
snap 2 disabled
...
snap n disabled
```

If `snapoff` fails, an explanatory message is displayed. Error codes are identified in `/usr/include/sys/errno.h`.

snaplist

This command must be invoked as:

`/usr/openv/netbackup/bin/driver/snaplist`

`snaplist` displays information about all active snapshots in the following form:

```
id  device              size   cached  cache               err time
1   /dev/rdsk/c0t3d0s0 72560  16450   /dev/rdsk/c0t4d0s0 0   12/19/99 13:23:48
```

Where:

- `size` is the size of the snapped frozen image source in 512-byte blocks.
- `cached` is the number of 512-byte blocks that have been cached (written to) for this snapshot since it was initiated.
- `err` is an error code; 0 indicates no error.

  If a snapshot has encountered an error, then `err` will be non-zero and the snapshot will be inaccessible. It can be terminated using `snapoff`. Error codes are identified in `/usr/include/sys/errno.h`. Also, error messages may be found in `/var/adm/messages`.

snapcachelist

This command must be invoked as:

`/usr/openv/netbackup/bin/driver/snapcachelist`

`snapcachelist` displays information about all partitions currently in use as snapshot caches. It is useful for monitoring the extent to which caches are full. Displayed output is of the form:

```
device               free      busy
/dev/rdsk/c0t4d0s0   238528    264472
```

Where:

- `free` is the number of 512-byte blocks available.

- `busy` is the number of 512-byte blocks that have been written to.

When a cache is full, any write to a snapped partition or snapped file system associated with that cache will cause the snapshot to fail and the snapshot will no longer be readable or writable. Reads or writes to the snapped partition will remain unaffected. The failed snapshot will not be terminated automatically and must be terminated using `snapoff` in the usual way.

Note Snapshots are initiated and terminated by NetBackup. While a backup is in progress, `snaplist` and `snapcachelist` can be used to monitor the snapshot.

Caution Do not terminate a NetBackup snapshot using `snapoff` while the backup is active because corruption of the backup image may result.

snapstat

The snapstat command must be invoked as:

```
/usr/openv/netbackup/bin/driver/snapstat
```

`snapstat` displays diagnostic information about the snap driver.

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